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REPORT

ON THE

DANISH OCEANOGRAPHICAL EXPEDITIONS 1908-1910

TO THE

MEDITERRANEAN AND ADJACENT SEAS

PUBLISHED AT THE COST OF THE CARLSBERG FUND

UNDER THE SUPERINTENDENCE OF

JOHS. SCHMIDT, PH. D.

DIRECTOR OF THE CARLSBERG PHYSIOLOGICAL LABORATORY, COPENHAGEN,
MEMBER OF THE DANISH COMMITTEE FOR THE STUDY OF THE SEA,
LEADER OF THE EXPEDITIONS

N° 3

VOL. II. (Biology), A. 2: Sternoptychidae (Argyropelecus and Sternoptyx) by P. JESPERSEN.
— - — D. 1: Isopoda, Tanaidacea, Cumacea, Amphipoda (excl. Hyperiidea) by K. STEPHENSEN.
— - — K. 1: Calcareous Algae by Mme PAUL LEMOINE.

COPENHAGEN
ANDR. FRED. HØST & SØN
PRINTED BY BIANCO LUNO

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VOL. II: BIOLOGY

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REPORT ON THE DANISH OCEANOGRAPHICAL EXPEDITIONS 1908-10
TO THE MEDITERRANEAN AND ADJACENT SEAS
Vol. II. Biology.

A. 2.

Sternoptychidae

(Argyropelecus and Sternoptyx)

by

P. Jespersen.

With 6 Charts in the text.

Published April 15. 1915.

CONTENTS

page

I. Introduction 3
II. The species 6
Argyropelecus affinis, Garman 6
— *hemigymnus*, Cocco 7
— *olfersi*, Cuvier 23
— *aculeatus*, Cuvier et Valenciennes 27
Sternoptyx diaphana, Hermann 28
III. Summary 30
IV. Literature references 32
V. Records of the hauls of *Argyropelecus* and *Sternoptyx* 34

I. INTRODUCTION.

In the course of the cruises made by the Danish marine investigation steamer "Thor" in the North Atlantic during the years 1904, 1905 and 1906, and in the Mediterranean in 1908—9 and 1910, a considerable amount of material of the genus *Argyropelecus* was collected, together with some few specimens of *Sternoptyx diaphana*. In addition to this, both genera were taken in very fair numbers on the cruise of the research schooner "Margrethe", from the Faeroes to the West Indies in 1913. I have also worked up a smaller quantity of material from the Straits of Messina, collected on the shore by Capt. G. Hansen in March 1911.

The material in question embraces all species of both genera hitherto known from the North Atlantic, with the exception af *Argyropelecus aculeatus* Cuvier et Valenciennes which, strange to say, was not taken on the cruise of the "Margrethe" in the Atlantic in 1913. The total numbers of specimens of the various species are as follows:

Argyropelecus affinis (Garman)	7
— *hemigymnus* (Cocco)	1559
— *olfersi* (Cuvier)	62
Sternoptyx diaphana (Hermann)	49

For purposes of determination I have chiefly had recourse to the following works: Brauer: Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition "Valdivia", Bd. XV Lief I. "Die Tiefsee-Fische" 1906, Regan: Report on the Marine fishes collected by Mr. J. Stanley Gardiner in the Indian Ocean (Transactions Linnean Society, London, XII. 1908), and Holt and Byrne: Sixth Report on the Fishes of the Irish Atlantic Slope 1913 (Fisheries, Ireland, Scientific Investigations 1912. I). Regan (1908) gives a comprehensive survey of the known species of the genus *Argyropelecus*, and notes, in addition to the four already mentioned, a new species, known only from a single specimen taken in the Indian Ocean, viz.: *Argyropelecus sladeni*. The classification of full-grown specimens presents no very serious difficulty; in the case of the smallest larval forms, however, it is not yet possible to determine with certainty. It is therefore not unlikely that the specimens classed as *Argyropelecus hemigymnus* may include some of the smallest individuals belonging to other species. This point is further referred to under the separate headings for the different species.

These fish, being taken as a rule at considerable depths, are always found to be dead when brought to the surface, the stomach being as a rule forced up into the cavity of the mouth. The rays of the caudal fin are often somewhat damaged by the net; the total lengths given in the present work are therefore, in all cases where nothing is stated to the contrary, reckoned as from point of lower jaw to base of caudal fin. For species of which sufficient material is available, lists will be found showing the approximate length of caudal fin corresponding to the respective total lengths.

As the implements of capture used on the cruises of the "Thor" and "Margrethe" were not entirely uniform, no direct comparison can be made between the material obtained by the two vessels. On the cruises of the "Thor", the young-fish trawl, as described by Dr. Johs. Schmidt in Vol. I. p. 8, was chiefly employed. On board the "Margrethe", on the other hand, the hauls were made partly with an open ring-trawl of 2 meters diameter, partly with open pelagic nets of silk and stramin, having a diameter of $1^1/_2$ meters. It is therefore probable that the relative fishing capacity of the "Thor's" nets was superior to that of the smaller implements used by the "Margrethe" in the Atlantic.

With regard to the depths at which the hauls were made, it should be noted that the present work records only the length of wire out; we know, as a matter of fact, very little indeed as to the actual depths fished by the various implements when several different types of these are used on the same wire. During the Atlantic cruise of the "Margrethe" in 1913, I had occasion to make a series of experiments in the Sargasso Sea with Capt. C. Clausen's Control Sea-sounder. The apparatus was used with various lengths of wire, to which a ring-trawl was attached, the speed being 2 knots per hour. The result showed a depth corresponding to over half the length of wire out; generally about two-thirds. The apparatus can, however, only be used for depths up to 500 meters, and cannot be employed when several implements are attached to the same wire. As regards the relation of depth fished to length of wire in this latter case, nothing is known with certainty; it would seem probable, however, that the implements then fish at a greater relative depth, on account of the greater weight, which increases with increasing number of implements out. I am therefore inclined to suppose that the nets used by the "Margrethe", which were always towed at a rate of 2 knots per hour, fished depths amounting to approximately two-thirds of the length of wire. The young-fish trawl used on board the "Thor" would, on account of its greater weight, probably fish deeper than any net towed singly by the "Margrethe"; this superiority may however, possibly be to some extent counteracted by the fact that the "Margrethe" always had from three to seven implements out on one and the same wire.

Table showing all hauls made in the Mediterranean.

("Thor" 1908—1909, 1910).

Length of wire	Day hauls	Night hauls	In all	Percentage of day hauls
25 meters....	7	75	82	8·5 %
65 —	12	41	53	22·6 %
150— 250 —	3	6	9	33·3 %
300— 400 —	23	51	74	31·0 %
500— 800 —	5	13	18	27·7 %
1000—1200 —	11	20	31	35·4 %
1400—1800 —	2	5	7	28·5 %
>2000 —	7	6	13	53·8 %
Total...	70	217	287	24·3 %

Table showing all hauls made in the Atlantic.

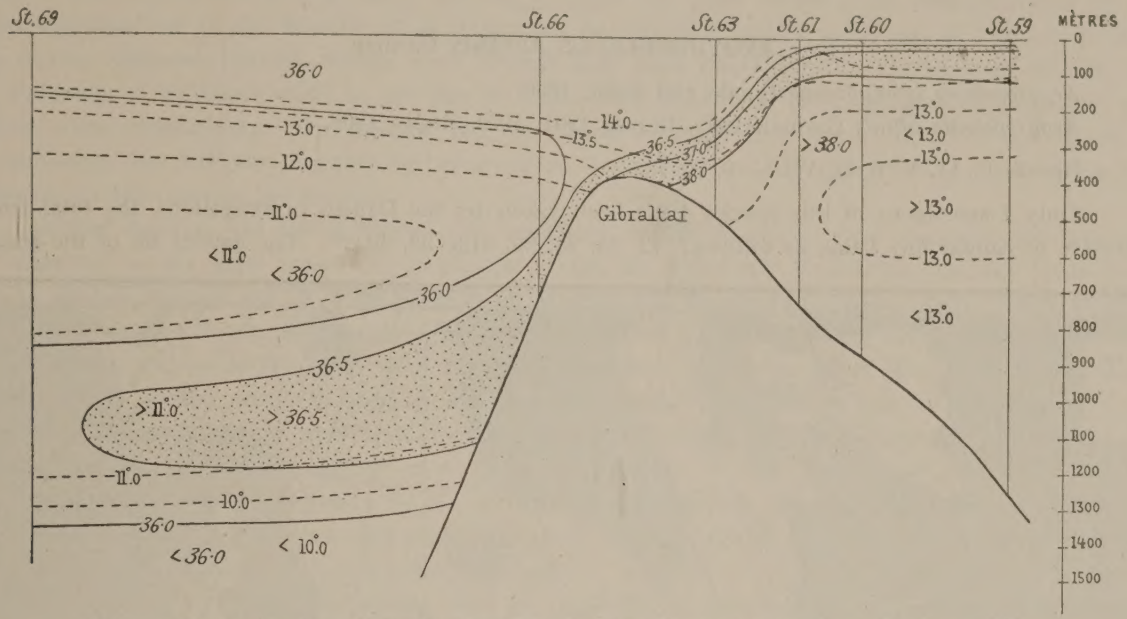
("Thor", 1905, 1906, 1908, 1909, 1910, + "Margrethe" 1913).

Length of wire	Day hauls	Night hauls	In all	Percentage of day hauls
25 meters....	12	85	97	12·3 %
65— 110 —	40	151	191	20·9 %
150— 250 —	8	80	88	9·0 %
300— 400 —	41	95	136	30·0 %
500— 800 —	18	23	41	43·9 %
1000—1200 —	7	19	26	26·9 %
1400—1800 —	8	7	15	53·3 %
>2000 —	5	12	17	29·4 %
Total...	139	472	611	22·8 %

The following tables furnish a comprehensive survey of the hauls made in the Mediterranean and the Atlantic. In considering the occurrence of these fish, it is important to know whether the hauls were made in the daytime or at night: this point has therefore been noted in each case.

On examining the distribution of the species here dealt with, an interesting feature presents itself in the fact that while one species only (*Arg. hemigymnus*) was found in the Mediterranean, both *Arg. olfersi* and *Arg. affinis*, as well as *Sternoptyx diaphana*, were taken in the Bay of Cadiz outside the Straits of

Gibraltar. Investigation of the hydrographical conditions in the Straits of Gibraltar furnishes a very plausible explanation of this peculiarity in the occurrence.



Hydrographical section through the Straits of Gibraltar (from SCHMIDT, NIELSEN and JACOBSEN, 1910).

From this it seems probable that the absence of these species in the Mediterranean is due to the high salinity there prevailing, possibly also in conjunction with the relatively higher temperature. The section above gives the hydrographical conditions as found from one end to the other of the Straits of Gibraltar, and shows how the species in question, on attempting to pass in to the Mediterranean at the depths at which they habitually move (presumably abt. 300—600 m.) would encounter the higher degree of salinity at the very entrance.

Finally, I wish to express my sincerest thanks to the leader of the Danish Atlantic Investigations, Dr. JOHS. SCHMIDT, for courteously permitting me to deal with the material here concerned, and for his kind assistance in the compilation of the present paper.

I have also to thank cand. mag. ADOLF JENSEN, who has very kindly permitted me to make use of the material from the cruises of the "Thor" in 1904—1906, despite the fact that this had already been deposited in the Zoological Museum at Copenhagen.

II. THE SPECIES.

ARGYROPELECUS AFFINIS Garman.

Argyropelecus hemigymnus Goode and Bean, 1896.
Argyropelecus affinis Garman 1899, Brauer 1901, 1906, Regan 1908.

Brr. 9, P. 11, V. 6, D. VII + 9, A. 13.

Only 7 specimens of this species have been taken by the Danish investigations, the total lengths (exclusive of caudal fin) being as follows: 12, 23, 23, 29, 31.5, 33, 40 mm. The caudal fin of the smallest

Chart I. *Argyropelecus affinis* (Garman). ● positive stations, + negative stations.

and largest specimens measured respectively 2.5 mm. and 8 mm. in length. The specific markings are, in the case of fully developed individuals, so distinctly evident in the shape of the body and the fairly continuous series of light organs, as to render confusion with other species quite impossible. The smallest specimen had the characters of the adult individual, with an almost continuous series of light organs.

The distribution of the species in the North Atlantic is peculiar, and would appear to be somewhat restricted. The 7 specimens mentioned were taken at four stations, all situated due west of the Straits of Gibraltar, in the Bay of Cadiz. Having in mind the great extent of the area embraced by the Danish investigations in the Atlantic, it is interesting to note that all the specimens of this species were taken at four different stations within a so limited field (*vide* Chart I). The two stations (65, 91), the most southerly of all those made in the Bay of Cadiz, have, moreover, the same position on winter and summer cruise respectively. On looking into the earlier recorded finds of this species, we are led to the conclusion that the area in question must in all probability be the approximate northern limit of occurrence in this part of the Atlantic.

Earlier finds in the North Atlantic are restricted to the following: One specimen was taken by the "Albatross" at the West Indies (15° 24′ N,—63° 31′ W), the "Valdivia" Expedition (Brauer 1906) found it in the Gulf of Guinea (St. 54, 1° 51′ N—0° 31′ E), and on the deep-sea expedition of the "Michael Sars" in 1910, (Murray and Hjort 1912) 3 specimens were taken, at St. 34, 28° 52′ N—14° 16′ W, St. 45, 28° 42′ N—20° 0′ W, and St. 48, 28° 54′ N—24° 17′ W. The Norwegian finds were thus made close to and west of the Canaries, which further tends to support the probability that the northern limit of occurrence of the species lies outside the Straits of Gibraltar. From previous investigations in conjunction with the Danish researches we may sum up as follows:

Argyropelecus affinis appears to be a species occurring only in the southern portion of the North Atlantic, its northern limit of distribution in the eastern part of the Atlantic being about Lat. 37° N (The Bay of Cadiz).

In this connection mention should also be made of the fact that the species has been found in the South Atlantic, off the southernmost point of Africa, and at several stations in the Indian Ocean. (Brauer 1906, Regan 1908).

The specimens above mentioned were taken on the cruise of the "Thor" in the Mediterranean, at Station 65, 66, 91 and 231, and at relatively considerable depths, the lengths of wire out being 1200 and 1600 meters. The water at these stations was, however, not particularly deep, the depth to bottom being 735—1300 meters. It is thus not depth, but probably temperature of the water which determines the northern limit of this species.

ARGYROPELECUS HEMIGYMNUS Cocco.

Argyropelecus hemigymnus Cocco 1829; Cuvier et Valenciennes 1828—49; Günther 1864; Moreau 1881; Facciola 1883; Günther 1887; Vaillant 1888; Alcock 1891; Goode and Bean 1896; Carus 1889—93; Lütken 1892; Jordan and Evermann 1896; Alcock 1899; Lo Bianco 1903; Collett 1903; Holt and Byrne 1904; Brauer 1906; Regan 1908; Fage 1910; Zugmayer 1911; Holt and Byrne 1913.

?*Argyropelecus Heathi* Gilbert 1891, 1905; Regan 1908.

Sternoptyx mediterranea Cocco 1838.

Brr. 9, P. 11, V. 6, D. VII + 8, A. 11.

Of this species, the only one found in the Mediterranean, and that of most frequent occurrence in the Atlantic, we have a good amount of material, embracing 1559 specimens in all. As there appear to be considerable differences in biological respects between the fish found in the Mediterranean and those of the Atlantic, I prefer to deal with the biological conditions separately, and then point out any differences which may be noted as for the two areas in question. Before proceeding to this, some general remarks as to the species may here be made.

Classification. The smallest specimens, i. e. larvæ of less than 7—8 mm. (exclusive of caudal fin), I have been unable to identify with certainty, and it is therefore not improbable that the great number of small specimens given in the lists for this species may include some larvæ belonging to other species, in which case most of them should probably fall to *Argyropelecus olfersi.* This however, doubtless only applies to the Atlantic, no specimen of the other species being, up to the present, known from the Mediterranean. As regards the doubtful small individuals, it should be noted that such have only been taken at stations where larger and distinctly determinable specimens of *Arg. hemigymnus* were taken at the same time.

In the northern part of our area in the Atlantic there will as a rule be no question of confusion between more than two species, viz. *Arg. hemigymnus* and *Arg. olfersi,* which renders it especially important to determine the specific differences between these two species.

The youngest larval stages appear, in the two species concerned, to be entirely alike. Various descriptions of the larvae of *Argyropelecus* exist; those given by Lo Bianco (1903), Brauer (1906) Fage (1910) and Holt and Byrne (1904, 1913) may be mentioned. None of these writers however, have been able to identify the youngest stages, which differ materially from the adult individuals.

I myself have, as already mentioned, been equally unable to effect such determination. I have, however, by noting the physical dimensions of full-grown specimens, which differ considerably in the two species endeavoured to find a working basis, which has proved of some value when dealing with younger individuals.

The method of procedure in this respect was as follows: I measured the length of the body (from point of snout to base of caudal fin), and height of same (from the foremost edge of the spinous rays in the dorsal fin perpendicularly to the edge of the ventral side) in a large number of specimens of both species. The ratio of $\frac{\text{length}}{\text{height}}$ then gave a distinctly different, though somewhat variable figure for the two species. These preliminary measurements, which were to serve as basis for investigation, were made exclusively with specimens over 12 mm., i. e. individuals which had in all essentials assumed the shape of the full-grown fish. The average figures, worked out to two places of decimals, were, for *Arg. olfersi* and *Arg. hemigymnus,* abt. 1.59 and 2.12 respectively. I have not been able to find any definite rule for the variation of the figures obtained within either species; I have, however succeeded in discovering a distinct difference in the mentioned ratio of $\frac{\text{length}}{\text{height}}$ between the two species when the calculations were carried to the second decimal place.

	Arg. olfersi		*Arg. hemigymnus*	
	No.	Percentage	No.	Percentage
2·50—2·60	..	..	2	0·2
2·40—2·50	..	..	19	1·9
2·30—2·40	..	..	28	2·8
2·20—2·30	..	..	170	16·9
2·10—2·20	..	..	334	33·2
2·00—2·10	..	..	386	38·4
1·90—2·00	..	..	61	6·1
1·80—1·90	..	..	5	0·5
1·70—1·80	7	14·0	..	..
1·60—1·70	15	30·0	..	..
1·50—1·60	14	28·0	..	..
1·40—1·50	12	24·0	..	..
1·30—1·40	2	4·0	..	..

The results of these investigations are shown compared in the table.

This method of procedure will be found useful as an aid to identification of larvæ of the two *Argyropelecus* species, even though it can only be of importance when dealing with somewhat older larval stages. My experience with this work has shown that it is frequently possible, by means of the method in question, to identify larvæ of *Arg. olfersi* in cases where other specific characteristics fail. (*vide infra*; *Arg. olfersi*). Larvæ of *Arg. hemigymnus* are as a rule so shaped as to give a figure for $\frac{\text{length}}{\text{height}}$ even higher than 2.50, whereas the corresponding figures for the older larval stages of *Arg. olfersi* lie as a rule between 1.50 and 2.00. Adult specimens may exhibit very

considerable variation in point of physical proportions, and the same applies, in a certain degree, to the larvæ.

A. The Mediterranean.

Material. During the cruises of the "Thor" in the Mediterranean, 821 specimens in all were collected, to which must be added 119 individuals washed up on the shore near Messina and there picked up by Capt. G. Hansen, of the Danish research steamer "Thor" in March 1911. These last-named specimens exhibit no difference, either in size or appearance, from the others.

The numbers of stations, hauls, and specimens taken in the Mediterranean fall to the various months as follows:

		No. of Stations	No. of hauls	No. of specimens
December	1908	6	11	178
January	1909	5	10	41
February	—	9	13	186
June	1910	5	9	59
July	—	14	20	112
August	—	14	18	228
September	—	4	4	17.

The material includes specimens of all sizes, comprising, however, a far greater proportion of smaller individuals. The largest specimen measured 41 mm. exclusive of, 49 mm. inclusive of caudal fin, which corresponds more or less to previous finds, so that this species may be regarded as rarely exceeding the size mentioned. The relatively greater number of large specimens among the material collected on the shore at Messina is doubtless merely due to the fact that smaller specimens would be less likely to attract attention. In the case of these specimens especially, the bodies were frequently found to have been damaged by rough usage, rendering measurement to base of caudal fin the only rational method of proceeding. The length of the caudal fin in this species is approximately shown in the following table, where the dimension in each case corresponds to the accompanying figures for length of body without caudal fin.

Specimens	< 12 mm.	Length of caudal fin	1—2 mm.
—	12—18 —	—	2—3 —
—	18—24 —	—	3—4 —
—	24—30 —	—	4—5 —
—	30—35 —	—	5—6 —
—	> 35 —	—	6—9 —

Distribution. It is not surprising that so common a fish as the *Argyropelecus hemigymnus* should long have been known in the Mediterranean, and occurrences of the species have been extensively dealt with in works on the subject. Among writers of more recent date may be mentioned Lo Bianco 1903, Mazzarelli 1909, 1910, Fage 1910, and Zugmayer 1911. The Italian writers in particular deal at considerable length with the numerous specimens which have been found washed up along the shore near Messina.

The special importance of the Danish investigations lies in the fact of their having been carried out simultaneously throughout the whole of the Mediterranean and adjacent seas; they are moreover, peculiarly valuable as including both summer and winter months, a point of the greatest weight in biological work.

The material thus procured furnishes proof that *Argyropelecus hemigymnus* is found in all parts of the Mediterranean, and in most of the adjacent waters with the exception of the Sea of Marmora and the Black Sea, where the lower degree of salinity and other physical conditions presumably prevent the species from thriving.

The geographical distribution is, however, also affected by depth conditions, this fish, distinctly bathypelagic as it is, being evidently restricted to certain deep sea regions. In this connection it is interesting to consider the depths noted at the stations made by the "Thor" in the Mediterranean. The table below, showing depths in meters, applies to both cruises.

If we then further consider the depths at those stations which show positive figures for this species, it will at once be evident that its occurrence is very largely limited to deep water, only one haul with a single specimen being noted at a station with less than 500 meters depth, the figure in this case being 365 m. Moreover, the average numbers of specimens for hauls over the different depths furnish additional proof of its fondness for water with great depth to bottom. The tables below illustrate this, showing at the same time the increasing proportional frequency of positive hauls with increasing depth.

0— 100 Meters	21 Stations
100— 500 —	19 —
500—1000 —	27 —
1000—2000 —	29 —
2000—3000 —	31 —
> 3000 —	9 —

Depth at the stations made	No. of specimens	Average no. pr. haul
up to 250 Meters...	0	0
250— 500 — ...	1	1
500—1000 — ...	130	10
1000—2000 — ...	298	19
> 2000 — ...	392	14

Depth at the stations made	Proportional frequency of positive hauls
up to 250 Meters ...	0 %
250— 500 — ...	1·8 -
500—1000 — ...	22·8 -
1000—2000 — ...	26·4 -
> 2000 — ...	49·0 -

It is thus probable that *Arg. hemigymnus* requires at least 300 meters of water, and is only quite exceptionally found within the 500 meter curve. It even keeps, for preference, to still deeper water, only 1.8 % of the positive hauls being made within the 500 meter curve, whereas 75.4 % lie beyond 1000 meters. These apparent requirements with regard to depth frequently serve to explain its non-occurrence in certain restricted portions of the Mediterranean. That it is not found in the Sea of Marmora is presumably due to the lower degree of salinity; apart from this, however, the comparatively slight depths which prevail between that water and the Ægean might also be advanced as a possible explanation.

Chart II shows all positive stations for this species in the Mediterranean. Of the negative stations, only such are here included as are situate over at least 300 meters depth of water, and where hauls were made with at least 100 meters of wire out. This last point will be further explained in the following.

Vertical occurrence. As was to be expected from previous investigations, *Argyropelecus hemigymnus* was found pelagically, for the most part at considerable depths. The greatest quantities were taken in nets towing with about 600—1200 meters of wire, which should probably be equivalent to a depth of at least 300—600 meters below the surface. The percentage of positive hauls with different lengths of wire was, on investigation, found to mark an ascending scale for depths from the surface to 1000—1200 meters of wire.

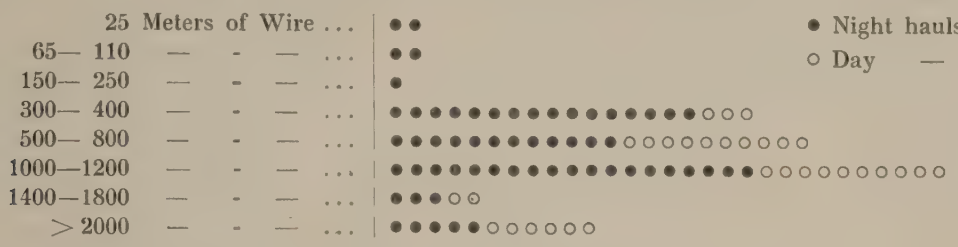
Length of Wire	Total no. of pelagic hauls	Positive hauls	Percentage of positive hauls
25 Meters ...	82	2	2·4 %
65— 110 — ...	53	2	3·7 -
150— 250 — ...	9	1	11·1 -
300— 400 — ...	74	19	25·6 -
500— 800 — ...	18	15	83·3 -
1000—1200 — ...	31	29	93·5 -
1400—1800 — ...	7	5	71·4 -
> 2000 — ...	13	11	84·6 -

It will be seen that by far the greater number of positive hauls were made with lengths of wire over 500 meters. Very striking is the relatively high percentage with length of wire > 2000 meters, even when allowing for the possibility that some at least of the fish brought up in nets on such a length of wire may have been taken from higher strata while hauling in. Repeated investigations made with a view to discovering the conditions of vertical distribution for the smallest specimens (i. e. < 10 mm.) failed to elicit any general rule for this, the distribution appearing to coincide in all essentials with that most common for the adult fish.

In considering the vertical distribution of this species, however, there is one factor which must evidently be regarded as of essential importance, viz; the vertical migrations which it appears to make in the course of the twenty four hours. Such migrations have long been supposed to take place, but the

question has, as far as these fish are concerned, never been rationally investigated hitherto except by Dr. HJORT, in his treatment of the material collected during the cruise of the "Michael Sars" in the Atlantic, 1910. This work will be further referred to when considering that part of our material of this species collected in the Atlantic. Dr. HJORT's investigations confirm this supposition, and the abundant amount of material with which we are here concerned likewise affords distinct support to the theory in question. The point is of sufficient interest from a biological point of view to warrant further consideration.

The positive hauls made are divided into day and night hauls, the day being taken as from 6 a. m. to 6 p. m. Hauls extending from one side to the other of either limit are assigned to the period within which the greater moiety of their duration lies. A comparison of day and night hauls, with the various lengths of wire, gives the following result for the Mediterranean, only positive hauls being here recorded:



The difference between positive day and night hauls may be more concisely shown in percentages, as follows.

Up to 500 m. wire:	12 % day hauls	88 % night
500—1000 - —	30.5 - - —	69.5 - —
1000—1500 - —	33.3 - - —	66.7 - —
1500—2000 - —	50 - - —	50 - —
> 2000 - —	80 - - —	20 - —

We have here, it is true, to reckon with the fact that in the Mediterranean, only about 25 % of the total number of hauls were made in the daytime, which must be duly borne in mind when comparing with the night hauls. Nevertheless, the result as regards the day hauls is as follows: of a total of 48 hauls made with lengths of wire ranging from 25 to 300 meters, only 3 were positive, all of these falling to the maximal length, i. e. 300 meters. From this it would seem that *Arg. hemigymnus* does not rise higher during the daytime than to a depth corresponding to this length of wire, (probably at least 150—200 meters down), whereas it may be found at night comparatively near the surface. The fact that it has been found floating at the surface itself during the day must presumably be due to quite extraordinary conditions.

The occurrence of the species in the Straits of Messina presents features which call for special consideration. The Italian scientists have long been aware of the peculiar fact that specimens both of pelagic species and of those more or less correctly termed "deep sea fish" are frequently found washed up on the coasts of this water. The finds of *Leptocephali*, for instance, are of classic fame. *Argyropelecus hemigymnus* is one of the most frequently encountered of the species thus washed up. GOODE and BEAN (1896) write as follows: "Giglioli obtained in September 1878 at Messina, over seven hundred in three days, brought to the surface by the swift current passing through the Straits." Capt. G. HANSEN, of the "Thor", when at Messina in 1911, set about collecting such stranded fish, and procured 119 specimens of *Arg. hemigymnus*. Several of these were found to be still living when picked up, and on some days, hundreds of these fish might be seen lying about the foreshore. This was especially the case on the stretch of coast from Messina harbour to the Faro lighthouse, and particularly on days when a S. W. wind prevailed, with current running in a northerly direction, occasioning a high sea setting inshore.

Propagation. As far as I am aware, the eggs of this species are not known in a free state; they are, however, probably to be found pelagically in the water. ♀♀ with the roe ripe may be found from

Chart II. *Argyropelecus hemigymnus* (Cocco). ● positive stations, + negative stations. (On

the 300 meters line and only hauls with more than 100 meters line out are recorded).

abt. 33 mm. (exclusive of caudal fin). The eggs are then fairly large in proportion to the size of the fish, measuring (when preserved in formol) about 1 mm. or a little more, in diameter. The abdominal cavity is then largely filled by the ovaries. The numbers of eggs found in the mature ovaries of this fish is remarkably small; I have counted the contents of a number of such ovaries, and found only 100—160 eggs, besides a quantity which did not appear to be developing at all.

The question as to spawning season of *Arg. hemigymnus* in the Mediterranean can, from the investigations made, only be answered by the assertion that the species spawns all the year round, with some indications, however, of greater activity in this respect during the months of spring. Mazzarelli writes, with regard to the Straits of Messina: "Ho avuto individui sessualmente maturi in aprile" (1909). We have, unfortunately, no investigations for April and May, so that nothing more definite can here be stated as to the period when spawning is at its height. Small specimens (< 10 mm.) are, as a matter of fact, found both during the summer months and in winter, as will be seen from the table.

Size in m. m.	Jan.	Febr.	March	June	July	Aug.	Sept.	Decbr.
40	..	..	..	..	1	..	..	..
39	..	..	..	..	1	..	..	1
38	..	..	..	..	..	..	..	1
37	..	1	..	..	..	2	..	1
36	1	..	..	..	..	1	1	2
35	..	..	..	..	2	..	.. ..	3
34	..	4	..	..	1	2	..	1
33	..	2	..	3	1	3	1	3
32	..	3	..	5	2	4	2	3
31	1	1	..	..	1	..	3	5
30	2	6	..	1	2	9	2	2
29	..	4	..	..	3	7	1	1
28	..	10	1	7	2	4	1	3
27	..	12	..	6	7	7	3	1
26	1	5	..	3	4	3	4	..
25	1	12	..	2	4	4	1	1
24	1	12	..	4	5	5	3	..
23	..	8	..	6	3	4	1	1
22	1	9	..	4	3	4	..	1
21	..	12	..	2	3	1	1	2
20	..	8	..	5	1	1	..	2
19	1	16	..	1	1	5	1	..
18	2	11	..	1	4	2	..	2
17	1	14	..	1	1	1	..	6
16	1	18	..	..	3	2	..	2
15	1	20	..	2	1	2	..	8
14	4	21	..	..	..	5	1	7
13	1	25	..	3	2	3	1	11
12	2	29	..	3	..	4	1	6
11	6	25	1	..	2	6	..	17
10	4	11	..	2	2	4	..	12
9	1	21	..	6	2	4	..	11
8	4	13	..	8	11	15	1	20
7	8	12	..	17	34	67	..	36
6	3	3	..	..	8	38	..	6
5	..	1	..	2	1	3	..	..

A comparison for the various months would seem, however, to indicate that the small fish are relatively least numerous in January and February (no pelagic material is available for the months immediately following). In February, fish < 10 mm. amount to abt. 18 % of the total number caught, so we may presume that these small sizes should still be encountered in the following months. Mazzarelli (1910) also writes: "Forme larvali e giovanili dagli 8—9 mm. in su finu all' adulto si rinvengono tutto l'anno".

I have made extensive investigations with a view to ascertaining, if possible, from the available material, what conclusions might be drawn as regards the most common time for spawning in the Mediterranean, and will therefore devote some space to closer consideration of this point. The method of the investigations was as follows: all ♀♀ with developed eggs were examined, and

1) Diameter of the most developed eggs measured,

2) Approximate cubic capacity of ovaries as compared with that of abdominal cavity noted.

We thus obtain two values on which to base the investigations, which should render the results more reliable. We have moreover, to reckon with one essential point, viz: the comparative frequency of individuals having an egg diameter of $^1/_2$ mm., while at the same time the whole consistency of their ovaries suggests that the development of the eggs towards ripeness is not very far advanced. This gives an additional reason for adopting the two parallel lines of investigation. The minimal limits for inclusion have been placed at an egg diameter of $^1/_2$ mm. in the one case, and ovaries occupying at least half the abdominal cavity in the other. Practically speaking, this gives a total length for the individual of not less than 25 mm. exclusive of caudal fin. The results of the investigations will be seen from the following table, showing the percentage of ♀♀ > 25 mm. with eggs > $^1/_2$ mm. in diameter (Method I), and percentage of ♀♀ > 25 mm. with ovaries occupying more than half the abdominal cavity (Method II).

I				II			
Month	Total of ♀♀ > 25 mm.	Egg diameter > $^1/_2$ mm.	Percentage	Month	Total of ♀♀ > 25 mm.	Ovaries > $^1/_2$ abdominal cavity	Percentage
December...	28	15	53.5 %	December...	28	2	7.0 %
January	3	1	33.3 -	January	3	1	33.3 -
February ...	56	32	57.0 -	February ...	56	14	25.0 -
March	38	28	73.6 -	March	38	17	44.7 -
June	23	6	26.0 -	June	23	1	4.3 -
July	31	4	12.9 -	July	31	1	3.2 -
August	49	6	12.2 -	August	49	0	0 -
September ..	20	2	10.0 -	September ..	20	2	10.0 -

It will be seen that both I and II exhibit a distinct difference between the spring months on the one hand and those of midsummer and immediately after on the other. It would therefore appear very probable that a strongly marked spawning activity takes place for instance in April. A comparison of the winter material as a whole with that from the summer cruise exhibits even more clearly the difference between the two periods as regards the features here concerned. (I and II refer to the two different methods of investigation as stated above.)

	I	II
Winter cruise (December—March).....	60.8 %	27.2 %
Summer — (June—September).....	14.6 -	3.2 -

The relatively greater difference between the results of the two methods in the summer material may be partly explained by the fact that this latter contained an exceptionally large number of specimens having eggs > $^1/_2$ mm. diameter, while the consistency of the ovaries on the other hand appeared to be very backward in developement — probably owing to the fact that spawning takes place for the most part at another time of year.

The result then, is as follows:

Argyropelecus hemigymnus has no definitely restricted spawning season in the Mediterranean; it does, however, spawn especially during the months of early spring.

Food. Having so large an amount of material available from the Mediterranean, I have made a number of investigations as to the contents of the stomach. As already mentioned, the stomach is generally found to be forced up into the cavity of the mouth when the fish are brought to the surface; it rarely contains anything but an indeterminable mass. The principal food of the species evidently consists of small fish. In several cases the stomach was found to contain bones and scales of such. That the species is voracious and predatory is evidenced by the fact that one individual was found to contain two undigested

specimens of *Cyclothone signata* (abt. 25 mm. long). Crustaceans also they do not despise. I have not infrequently found copepods and *Euphausidæ*; also once remains of a cephalopod (?) and a specimen of *Pteropoda gymnosomata.*

B. The Atlantic.

Material. The present material was collected partly during the cruises of the "Thor" from 1904 to 1910, and partly during the Atlantic cruise of the "Margrethe" in 1913. It includes 659 specimens in all, from 54 positive stations. As already mentioned, the identification of some of the smaller *Argyropelecus* specimens is attended with some uncertainty, and it is therefore possible that the individuals assigned to this species may comprise some undeterminable ones which should be placed elsewhere.

Distribution. In the Atlantic, *Argyropelecus hemigymnus* has been found in numbers along the coasts of western Europe and North Africa and by American investigations in the western part of the North Atlantic. It has also been taken at several places in the South Atlantic, and in the Indian Ocean (Brauer 1906) as well as in the Pacific (provided that *Argyropelecus Heathi,* Gilbert = *Argyropelecus hemigymnus* Cocco) near the Hawaiian Islands (Regan 1908). Brauer (1906) gives a comparison of the finds made up to that date (q. v.); in the present work, reference will only be made to recent finds. The German South Polar expedition 1901—03 found it in the Gulf of Guinea and along the western coast of North Africa (Pappenheim); it has also been found in considerable numbers between Portugal and the Azores, and in the neighbourhood of Madeira and the Canaries (Zugmayer 1911). During the cruise of the "Michael Sars" in the Atlantic, 1910, about 300 specimens were secured, partly off the coasts of western Europe, the Canaries, and the Azores, and partly throughout a section from the last named islands to Newfoundland, (Murray and Hjort 1912). It has not hitherto been known in Iceland waters, but three specimens taken at the Vestmannaeyjar on November 16, 1907, and which I have been able to examine at the Zoological Museum in Copenhagen, indubitably belong to this species.

On the cruise of the "Thor", *Arg. hemigymnus* was found from the waters west of the Faeroes southward to the Bay of Cadiz, and on the cruise of the "Margrethe" in the Atlantic in 1913 it was encountered all the way across that ocean as far as 60° W. (*vide* Chart III). On board the "Margrethe", we found it at practically all stations where the fishing implements were payed out to sufficient depth. The ordinary northern limit of distribution of the species thus lies about 62° N.

There is thus nothing surprising either in the fact as noted above, of its having been found washed up on the coasts of Iceland, or in the statement made by Collett (1903) as to a specimen having reached as far as Norway. Such occurrences must, however, be regarded as rare. The infrequency with which this species is washed ashore on the coasts referred to, in contrast to *Arg. olfersi* (q. v.) which has its ordinary northern limit of distribution considerably farther to the south (abt. 51° N.) may be explained by the presumably superior longevity of the latter species. *Arg. olfersi* could, theoretically speaking, be carried relatively farther from its normal habitat than the comparatively short-lived *Arg. hemigymnus.*

As in the Mediterranean, the species is not, save for a single station of 140 meters depth, found within the 300 m. isobath, but is apparently of common occurrence beyond the 500 m. line. The northern limit of distribution of the species is presumably determined by temperature; otherwise, it is found almost everywhere along the coasts of western Europe, provided there is sufficient depth of water. It has thus been found in the Bay of Biscay, nearly up to the limit of the deep Atlantic water and the positive stations from this point out to the coast of Ireland follow the isobaths in the clearest manner (*vide* Chart II).

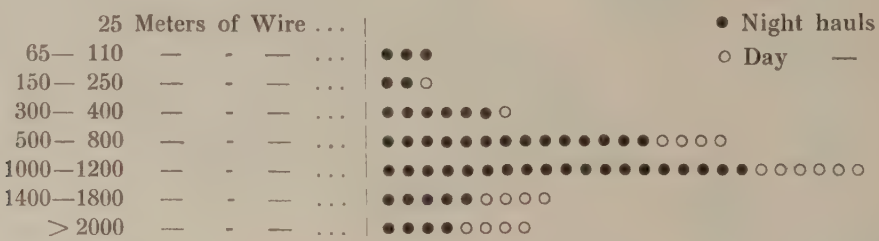
Vertical Distribution. The percentage of positive hauls falling to the various lengths of wire will be seen from the following table, which exhibits, as in the case of the Mediterranean, an increasing percentage of positive hauls up to 1000—1200 m. of wire. The question of direct comparison between

Chart III. *Argyropelecus hemigymnus* (Cocco). ● positive stations, + negative stations.

the vertical distribution of the species in the Mediterranean and the Atlantic will be dealt with later on; for the present it will suffice to call attention to the remarkably abrupt increase in the percentage of positive hauls from 3—400 meters of wire to 5—800. This corresponds very closely to the figures for the Mediterranean.

Length of Wire	Total No. of pelagic hauls	Positive hauls	Percentage of positive hauls
25 Meter.....	97	0	0 %
65— 110 —	191	3	1·5 -
150— 250 —	88	3	3·4 -
300— 400 —	136	8	5·8 -
500— 800 —	41	22	53·6 -
1000—1200 —	26	23	88·4 -
1400—1800 —	15	11	73·3 -
>2000 —	17	9	52·9 -

Here likewise the question of vertical migrations in the course of the 24 hours demands attention, and we find, as will be seen from the following table, that such migrations evidently take place in the Atlantic as in the Mediterranean, the upper limits for night and day coinciding, in the main, for both waters.



The difference may be more concisely shown in percentage, as follows:

Up to 500 m. Wire:	15·4 %	day	hauls,	84·6 %	night	hauls
500—1000 - —	22·2 -	—	—	77·8 -	—	—
1000—1500 - —	24·0 -	—	—	76·0 -	—	—
1500—2000 - —	44·4 -	—	—	55·6 -	—	—
>2000 - —	50·0 -	—	—	50·0 -	—	—

For purposes of comparison, the following statement taken from Dr. Hjort's investigations (Murray and Hjort 1912) as to this species may be quoted: "The bulk occurred at depths between 150 and 500 meters; no individuals were caught above 150 meters, and only 7 per cent were taken at depths lower than 500 meters... A closer investigation showed that the individuals captured a depth of 150 meters were all caught at night". The material in question amounted to 286 individuals in all.

Propagation. Our finds of *Arg. hemigymnus* in the Atlantic range from Lat. 22° N. to Lat. 61° N. Of the external conditions within this wide field the temperature of the water is probably the most variable factor. (Minimal surface temperature at St. 61·05, was 8° 87, maximal, at St. 1036, being 27° 40). It is therefore of considerable interest to note how far these outward conditions exert any remarkable influence upon propagation.

It would scarcely be justifiable to directly compare the results obtained from the cruise of the "Margrethe" in the Atlantic and those of the "Thor", as the implements used were not always the same; unfortunately, however, the amount of material collected by either vessel alone would be insufficient for our purpose, and it will therefore be necessary to take the total from both ships as one.

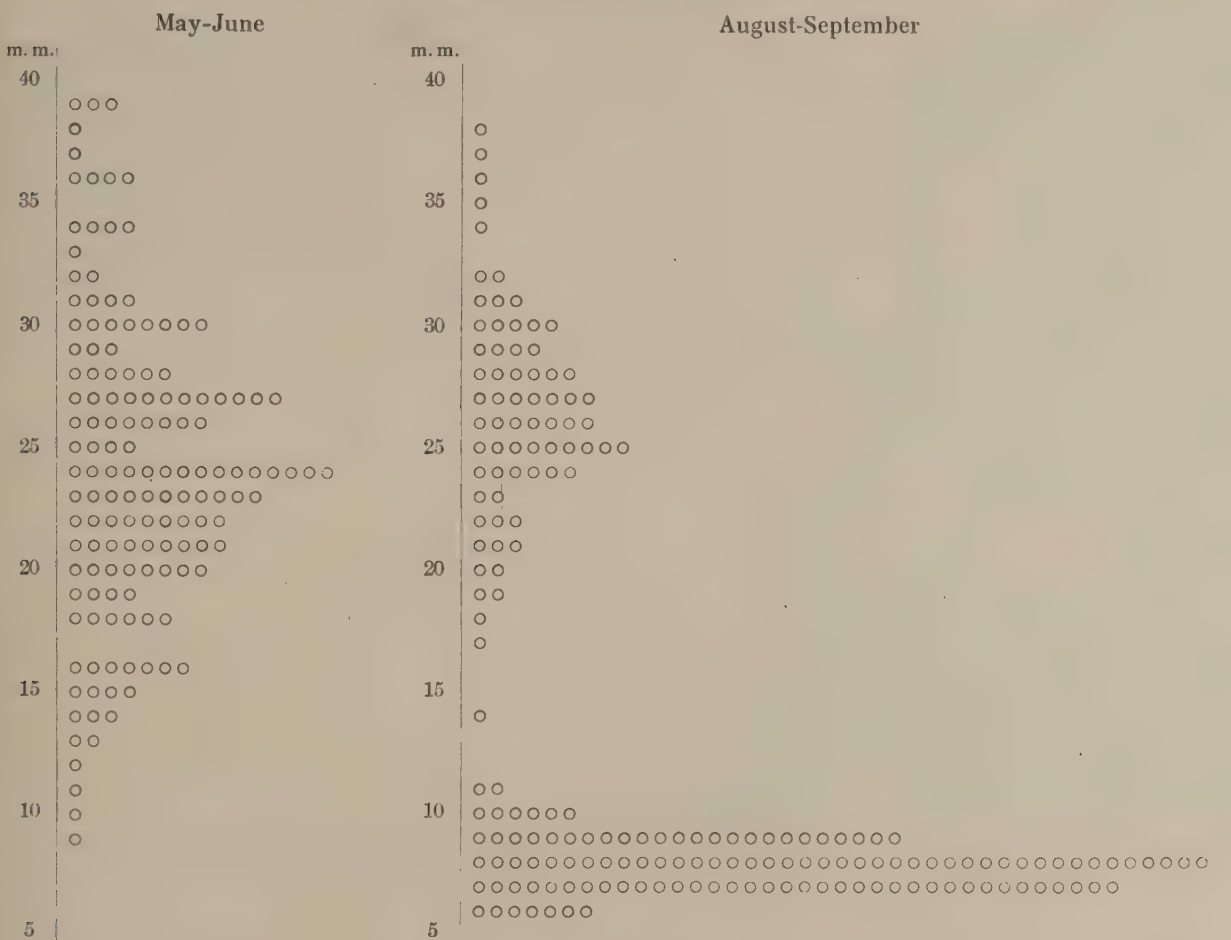
As already mentioned, no evidence was obtained from the Mediterranean material to prove the existence of any absolutely restricted spawning season for this species, the results obtained, however, seemed to suggest that spawning took place for the most part in the spring. If we now divide the present Atlantic material into two parts, with Lat. 40° N. as the dividing line, a certain difference between the two will be apparent.

Taking first the material collected N. of 40° N. and grouping the fish by length for early summer (May—June) and late (August—September), we find a difference so marked as to leave but little doubt

that *Arg. hemigymnus* has, in the colder water, a distinct spawning season, which probably falls in early summer or about midsummer. The group for autumn is thus to be considered as the 0 group. From the graphical illustration it would almost seem that these fish commence to spawn when only 1 year old, there being apparently only one group above the 0 group.

We may now proceed to consider the material from S. of 40° N. Here the result appears to be different. We have now only the material from the "Margrethe" for the autumn, that from the "Thor" however, comprising a single station with a considerable quantity taken in the Bay of Biscay during the

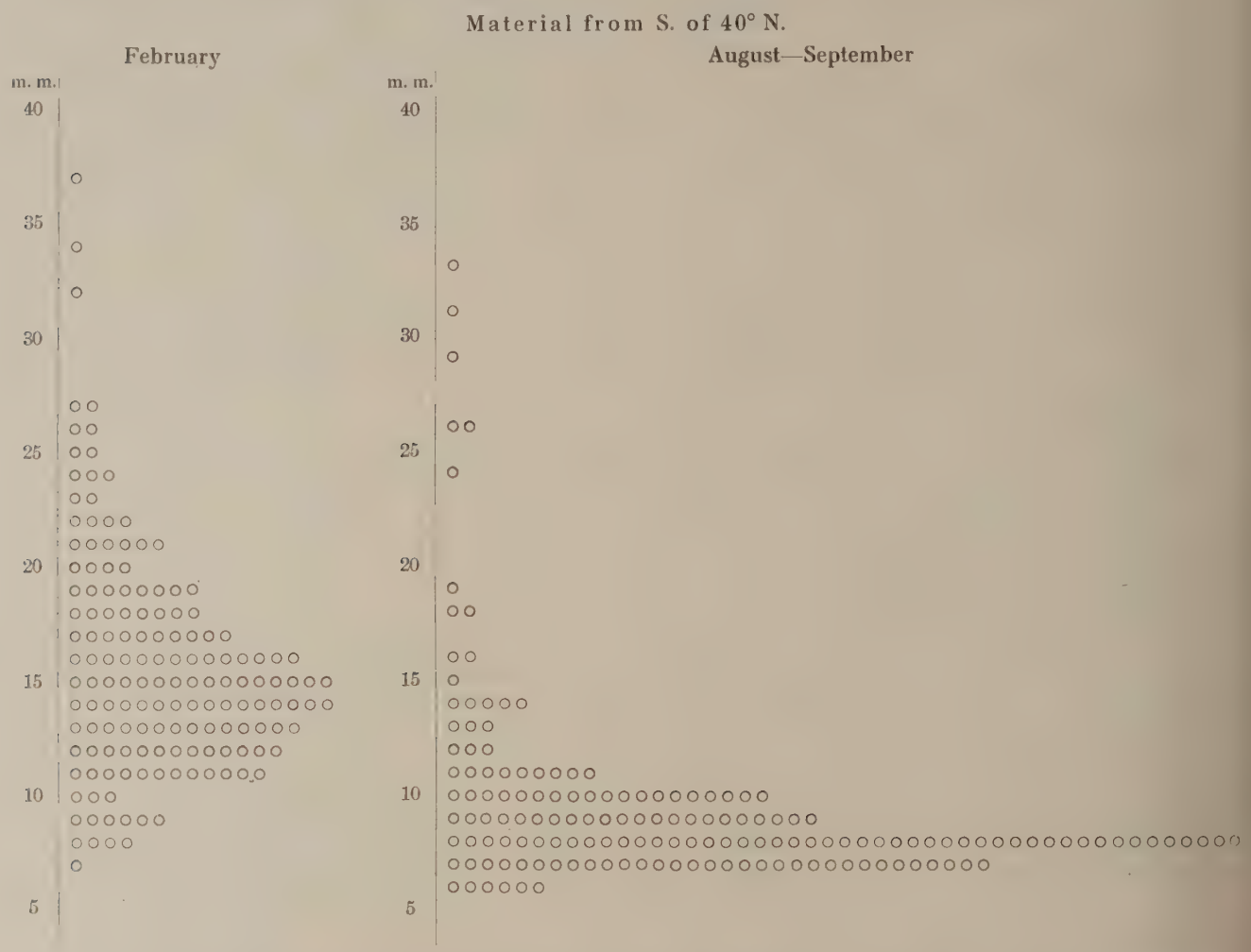
Material from N. of 40° N.



month of February. On consideration of the material from February, we find that the small sizes are already relatively numerous, while that taken by the "Margrethe" in August—September exhibits a distinct predominance of small sizes, as will be seen from the graph.

On comparing the figures for spring and autumn, we arrive at the result that *Argyropelecus hemigymnus* has a distinctly restricted spawning season in the colder water of the Atlantic (N. of abt. 40° N) whereas it appears to spawn all the year round in the warmer Atlantic water (S. of abt. 40° N.) although the spawning here seems to take place for the most part at the same time as in the northern portions of the Atlantic.

In this connection, I may briefly mention a feature worthy of note, as to the cause of which I am unable to state anything definite, though the fact in itself may give rise to various suppositions, viz; the geographical distribution of the smaller specimens in the Atlantic. In the accompanying Chart IV will be found noted the average lengths for the individuals taken at the different stations. These figures, however, only apply to the autumn material, partly owing to the fact that, as already mentioned, only larger specimens are found in the northern area in the spring, and partly because no investigations have been made in the open waters of the Atlantic west of the Azores during the spring months.



The distribution of the smaller specimens of *Arg. hemigymnus* is thus seen to present interesting peculiarities. The fact that only the larger sizes have been encountered in the northern area may be due to situation, the area in question lying to the north of the spawning field; it is nevertheless interesting to note that while large and small individuals may be found indiscriminately along the coasts of western Europe, those taken during the cruise of the "Margrethe" in the open Atlantic between the Azores and the Bermudas were almost exclusively of smaller size. The distribution of the sizes however, affords no clue as to possible migration.

C. The Mediterranean and the Atlantic compared.

The occurrence of *Argyropelecus hemigymnus* in the Mediterranean and in the Atlantic presents various points of difference. A comparative survey of the number taken per hour shows a relatively greater quantitative occurrence in the Mediterranean than in the Atlantic.

Chart IV. *Argyropelecus hemigymnus* (Cocco). Average-sizes in mm.

Mediterranean, "Thor". Positive hauls 85, Total No. of hours, 74, Total number caught 821, giving an average of 11—12 per hour.

Atlantic, "Thor" and "Margrethe". Positive hauls 75, Total No. of hours 166, Total number caught 738; average 4—5 per hour. ("Thor" 7—8 per hour).

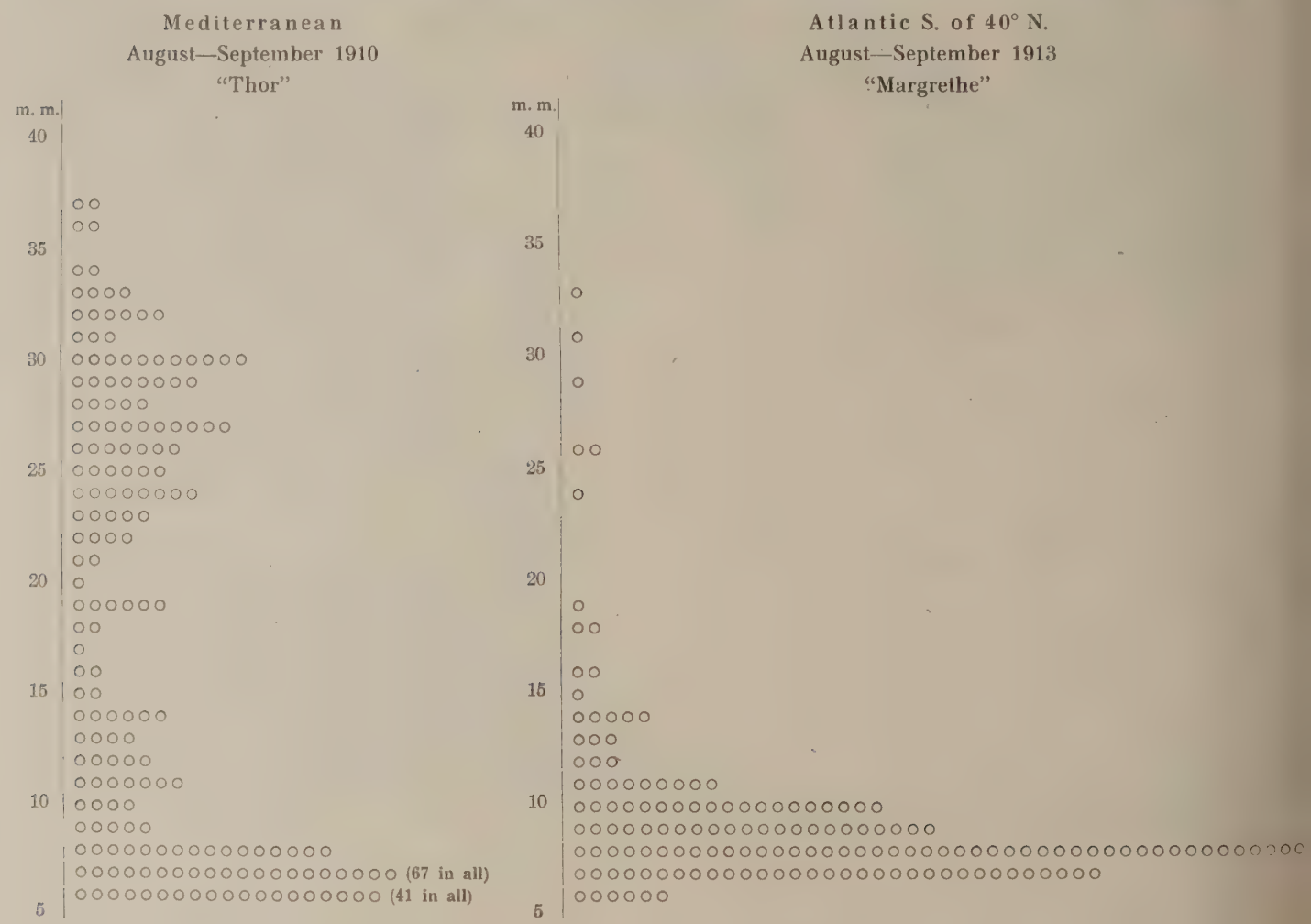
We are not, quite justified, however, in making direct comparison between the material from the "Thor" and that from the "Margrethe", as the implements used on board the two vessels were not in in all cases identical. The figures for each ship should therefore be taken separately, which done, we find the following difference, which may possibly be accounted for simply by the different fishing capacity of the implements used:

Atlantic:

"Thor". Positive hauls 50. Total No. of hours 66. Total number caught 522, giving an average of 7—8 specimens per hour.

"Margrethe". Positive hauls 25. Total No. of hours 100. Total number caught 216; average 2—3 per hour.

It is possible however, that the very considerable difference may in part be due to the widely different areas worked by the two vessels. At any rate, it would seem that a very noticeable difference



in the quantitative occurrence of *Argyropelecus hemigymnus* in the Mediterranean as compared with the Atlantic may be taken as beyond dispute.

Of late years, racial differences have been shown to exist in the case of various species of fish found both in the Mediterranean and in the Atlantic, and I have also considered the possibility of such being the fact with the species here concerned. I have therefore made various investigations in this respect without, however, coming to any positive result. My countings of vertebræ, branchiostegal rays and fin rays show that no numerical variation exists as regards these factors, which precludes the

possibility of demonstrating any racial difference on the basis of these characters. The specimens from the Atlantic certainly appear to exhibit a somewhat closer dark pigment than those from the Mediterranean; this dissimilarity is not, however, sufficiently marked throughout to serve as basis for any definite statement as to racial difference.

It is interesting to compare the spawning times in the Atlantic with those for the Mediterranean. As already mentioned, a noticeable difference exists between the absolutely restricted spawning season in the northern portion of the Atlantic area and the far less distinctly marked spawning time in the Mediterranean. It may now be worth while to investigate how far the conditions prevailing in the southern portion of the Atlantic (S. of 40° N) correspond to those of the Mediterranean. In the Bay of Cadiz we find an apparent similarity in this respect to Mediterranean conditions (cf. the February station mentioned in previous section). South of 40° N, however, we have only the material from the "Margrethe" for the autumn, and this is not sufficient to warrant any definite statement; a certain uniformity of conditions between the Mediterranean and that portion of the Atlantic S. of 40° N. is, however, as will be seen from the table p. 22, by no means impossible.

With regard to the occurrence of *Arg. hemigymnus* in the Atlantic and the Mediterranean, there is one more feature which should be briefly noticed, as tending to exhibit a certain difference between the two waters, though possibly this should not be regarded as of too great importance. On comparing the percentage of positive hauls, a distinct variation in the vertical occurrence of *Arg. hemigymnus* is observed.

Percentage of positive hauls.

Length of wire	Mediterranean	Atlantic
25 Meters..	2·4 %	0 %
65— 110 — ..	3·7 -	1·5 -
150— 250 — ..	11·0 -	3·4 -
300— 400 — ..	25·6 -	5·8 -
500— 800 — ..	84·4 -	53·6 -
1000—1200 — ..	93·5 -	88·4 -
1400—1800 — ..	71·4 -	73·3 -
>2000 — ..	84·6 -	52·9 -

It will be seen from the table above, that the percentage of positive hauls up to 1000—1200 meters of wire is throughout higher for the Mediterranean than for the corresponding lengths of wire in the Atlantic. If not merely due to numerical superiority of the species in the Mediterranean, this might be taken as indicating that the fish keep relatively closer to the surface in this water than in the Atlantic.

ARGYROPELECUS OLFERSI Cuvier.

Sternoptyx olfersii Cuvier 1829; Düben och Koren 1844.

Argyropelecus olfersii Cuvier et Valenciennes 1828—49; Lowe 1850; Günther 1864, 1887; Collett 1875, 1879, 1884, 1896, 1903; Jordan 1887; Vaillant 1888; Lilljeborg 1891; Lütken 1892, 1892 a; Smitt 1895; Goode and Bean 1896; Jordan and Evermann 1896; Brauer 1906; Regan 1908; Zugmayer 1911; Holt and Byrne 1913.

Pleurothyris olfersi Lowe 1850.

?*Argyropelecus caninus* Garman 1899; Regan 1908.

Brr. 9, P. 11, V. 6, D. VII + 9, A. 11—12.

Material. The present material comprises 60 specimens from a total of 23 stations in the Atlantic, partly from the cruises of the "Thor" and partly from that of the "Margrethe" in 1913. As it is generally impossible with certainty to identify *Argyropelecus* larvæ of less than 7—8 mm. it is not unlikely that a number of the specimens below this size, found in the Atlantic, and classed under the heading of *Argyropelecus hemigymnus* may really belong to the species here considered. As already mentioned, I have in my own investigations taken the relative value of $\frac{\text{length}}{\text{height}}$ as a determining factor, and have thus, in the case of some specimens, obtained figures distinctly indicating this species as opposed to *Arg. hemigymnus*, while other specific characters were not distinctly marked. My experience has shown that the

Chart V. *Argyropelecus olfersi* (Cuvier). ● positive stations, + negative stations.

determination of species cannot always, in the case of smaller specimens (8—12 mm.) be accomplished exclusively by means of the spiny process on the properculum, which is turned downwards in full-grown individuals. This is a point which I have not seen referred to in other works upon the subject, and should therefore be borne in mind when identifying the smaller sizes. I have found specimens with physical dimensions distinctly characteristic of *Arg. olfersi*, yet very often with more or less evident indications of a rearward-pointing spine — besides one pointing downward — on the properculum. I therefore conclude, from the observations made, that the young of *Arg. olfersi*, like those of *Arg. hemigymnus*, have a rearward-pointing spine in process of formation; this does not, however, in the case of the former, reach any advanced stage of developement. The determination of species is thus naturally rendered still more difficult in the case of young specimens (8—12 mm.); I am, however, of opinion that the measurement of physical dimensions will in many cases, if not in all, facilitate the task of identification. The same may to a certain extent be said of the abdominal spines as a specific character in young specimens.

Size. In comparison with *Arg. hemigymnus*, *Arg. olfersi* attains considerably superior dimensions. As far as I have been able to ascertain from extant works on the subject, the Danish investigations can claim the credit of having taken the largest specimen of this species yet known. Large specimens have previously been taken; among others may be mentioned one of 99 mm. from the Azores (Collett 1896), one of 96 mm. between the Azores and Portugal (Zugmayer 1911), one of 95 mm. from Iceland (Sæmundsson 1909) and one of 94 mm. from Norway (Collett 1903). The specimen taken by the Danish research steamer "Thor" in the Bay of Biscay had a total length of 115 mm. (96 mm. exclusive of caudal fin). The two largest specimens, that of 96 mm. above mentioned and another of 79 mm. (full length 96 mm.) were both taken at St. 74 in the Bay of Biscay. The third in order of size, 65 (76) mm. at St. 240 was also taken in the Bay of Biscay, both these stations lying beyond the 3000 meter line. All the remaining specimens fall below 40 mm.

Distribution. *Arg. olfersi* has, like the other species, a very wide area of distribution. It has been found in the Atlantic from the North Cape (Collett 1903) and the coast of Iceland (Sæmundsson 1909) to the southernmost point of Africa (Cuvier et Valenciennes 1828—49). In the North Atlantic it has been taken along the coasts of western Europe and the east coast of America. Brauer (1906 q. v.) has noted the localities of finds made up to date. Since then, we have the following statements: In the south-west coast of Iceland and the Westmanna Islands 26 specimens have been collected in the course of 17 years, some being found washed up on the shore, others taken from the stomach of various fish (Sæmundsson 1909). In January—December 1909, three specimens were brought to the Museum at Bergen, all found floating in the water (Grieg 1911). On the deep sea expedition made by the "Michael Sars" in the North Atlantic in 1910, 53 specimens in all were taken, at 6 stations situated near the Azores and east of 30° W. (Lat. 35° N to 50° N) (Murray and Hjort, 1912).

Besides the South Atlantic, the species has also been found in the Indian Ocean, and, (provided *Arg. caninus* Garman = *Arg. olfersi* Cuvier; *vide* Regan 1908) by American scientists in the Pacific. Of more recent date is the find made by the Siboga Expedition in the East Indies (Lat. 6° 24′ S, Long. 124° 39′ E.) (Weber 1913).

The Danish investigations in the North Atlantic (Chart V) confirm in all essentials the finds previously made. The species hat not been found in the Mediterranean, but in the Bay of Cadiz, the Bay of Biscay, and S. W. of Ireland. Judging from our investigations, its northern limit of distribution should lie about Lat. 52° N. This is, however, disputed by the comparatively numerous finds of the species along the coasts of Norway (abt. 23 specimens) and Iceland (abt. 26). Nevertheless, there may perhaps be some justification for asserting that it does not ordinarily occur north of the latitude named, the appearance of specimens on the coasts of Norway and Iceland being probably due to peculiar conditions. Most of the specimens recorded from the coasts in question have been found after heavy gales, either floating at the surface of

the water, or washed up on the shore. From the present material, the species would appear to be of somewhat more southerly origin than *Arg. hemigymnus*. None were found, for instance, on the cruise of the "Margrethe" in the Atlantic 1913 over the range from the Færoes to the Azores. A single specimen of the species is said to be preserved in the Museum at Berlin, this having been taken between the Canaries and Brazil (Brauer 1906). Otherwise, I have been unable to discover any statements as to finds of the species which would serve to connect up the records from Europe with those from America. It will therefore be of interest to note that during the cruise of the "Margrethe" in the Atlantic, I succeeded in demonstrating the occurrence of this species across the North Atlantic Ocean between Lat. 22° and 42° N. (Chart V).

Propagation. Nothing can be said with certainty as to the size at which this species reaches maturity, owing to the paucity of large specimens in the available material. The two largest, 96 (115) mm. and 79 (96) mm., which were taken at the beginning of March, were both females with ovaries well developed, but hardly yet ready to spawn. The third in order of size, 65 (76) mm. was a male. Two females of 37 (44.5) mm. and 40.5 (49) mm., both taken in June, were found to have roe very slightly developed.

With regard to the geographical distribution of the different sizes, there is nothing especially remarkable to record. It is worthy of note, however, that the three largest specimens were taken in the Bay of Biscay at approximately the same locality (2 in March, 1 in September), and that those taken in the open sea between the Azores and Bermuda were nearly all small fish of less than 30 mm.

The question as to definite spawning time if any cannot be treated here, owing to lack of material. Judging from the largest specimens, however, it would perhaps seem most probable that the spawning takes place at some time during the summer, at any rate, later than the month of March.

Biological Remarks. *Arg. olfersi* is indubitably a more distinctly oceanic fish than the closely related species, *Arg. hemigymnus*. The mere fact of its non-occurrence in the Mediterranean at once points in this direction, and the localities at which it is encountered in the Atlantic afford further convincing proof. That it is not found in the Mediterranean is presumably due to the high salinity of the water; this need not, however, be the only reason, as the question of depth is evidently a point of importance in determining its distribution. A comparison of the depths to bottom at the spots where *Arg. olfersi* was taken reveals the interesting fact that it is not found within the 1200 m. limit.

In this connection it may be worth while to consider the relation between the numbers of hauls made in the Atlantic at different depths. In this, as in similar examination of the depths, the stations made by the "Margrethe" are disregarded, no actual soundings having there been made with the lead. All were, however, made in water of very considerable depth.

0— 100	Meters	70 hauls
100— 500	—	78 —
500—1000	—	50 —
1000—2000	—	109 —
2000—3000	—	19 —
3000—4000	—	19 —
> 4000	—	53 —

The mere fact that the species not been taken within the 1200 m. limit affords some explanation as to why it should be found in the Bay of Cadiz immediately outside the Bay of Gibraltar, but not in the Mediterranean. This fish, which evidently requires a depth of at least 1000 m. of water would, in order to penetrate through the Straits of Gibraltar, be forced to pass over depths exceeding 5—600 meters.

A glance at the vertical distribution of *Arg. olfersi* reveals various points of interest. We have seen from the foregoing, that it requires a great depth of water; this does not, however, prevent it from moving comparatively near the surface in places where such depth exists. A comparison of the lengths of wire used for the positive hauls of this species affords eloquent testimony as to its vertical distribution.

It has been taken in a single haul with 150 meters of wire; the great majority, however, lies as will be seen, between 500 and 1200 m. of wire, which corresponds more or less to the occurrence of *Arg. hemigymnus*. It will moreover be noticed that only one positive haul was made with length of wire

> 2000 m., which may presumably be taken as indicating that the single specimen concerned was probably captured as the net was hauled in.

It would thus appear likely that the species is not found below a depth corresponding to 2000 meters of wire. The number of specimens taken, however, is so small, that care must be observed in making any comparison with *Arg. hemigymnus*. Nevertheless, there does appear to be a distinct difference between the two species as far as vertical distribution is concerned. In the case of *Arg. hemigymnus*, out of 30 hauls made with length of wire > 2000 meters, 19 were positive (63·3 %) whereas for *Arg. olfersi*, we have 17 hauls with wire > 2000 m. and only 1 of them positive (5·9 %). This would seem to suggest that *Arg. olfersi* is to a higher degree than *Arg. hemigymnus* denizen of the intermediate strata above great depths to bottom.

Length of Wire	Total No. of pelagic hauls	Positive hauls	Percentage of positive hauls
25 Meters...	97	0	0 %
65— 110 —	191	0	0 -
150— 250 —	88	1	1·0 -
300— 400 — ...	136	6	4·4 -
500— 800 —	41	10	24·4 -
1000—1200 —	26	6	23·0 -
1400—1800 —	15	3	20·0 -
> 2000 —	17	1	5·9 -

The question of vertical migrations during the 24 hours will be found interesting in the case of this species, the positive hauls with different lengths of wire revealing a very characteristic distribution for day and night hauls as will be seen from the following table:

150— 200 Meters of Wire ...	●●
300— 400 — - — ...	●●●●●●●
600— 800 — - — ...	●●●●●●●●●○
1000—1200 — - — ...	●●●●○○
1500—1800 — - — ...	●○○
3000 .. — - — ...	○

● Nigth hauls
○ Day —

The amount of material available is unfortunately too small to enable us to draw conclusions with certainty from such a comparative survey as that here given; there seems, however, to be sufficient indication of vertical migrations being made during the 24 hours, and the present material shows, that *Argyropelecus olfersi* rises during the night to a distance from the surface corresponding to 150 meters of wire, whereas in the daytime, it keeps to depths equivalent to at least 6—800 m. wire. It would at any rate seem fairly certain that the species is not found during the day in water layers = less than 3—400 m. of wire, none of the 101 day hauls made in these strata (72·6 % of the total day hauls made) being positive. With regard to the night hauls, I may further mention that 236 of these (50·3 % of the night total) were made with lengths of wire < 150 meters, from which it would seem justifiable to conclude that *Arg. olfersi* is not generally found in the waters layers above this limit during the night.

The contents of stomach of the largest specimen comprised about ten *Nyctiphanes sp.* Otherwise, no determinable matter was found in the stomach of this species.

ARGYROPELECUS ACULEATUS Cuvier et Valenciennes.

Argyropelecus aculeatus Cuvier et Valenciennes 1849; Günther 1864; Goode and Bean 1896; Collett 1903, 1905.

Sternoptyx acanthurus Cuvier et Valenciennes 1849.

?*Argyropelecus lychnus* Garman 1849; Regan 1908.

Brr. 9, D. IX + 9, V. 6, P. 9, A. 7 + 5 (Brauer 1906).

As mentioned in the introduction *Argyropelecus aculeatus* was strangely enough, not found in the course of our cruise across the Atlantic on board the "Margrethe" in 1913. The species, which is closely related to *Argyropelecus olfersi* Cuvier, is as regards adult specimens, easily recognisable *inter alia* by a row of small spines along the ventral line of the tail, and by the relatively greater height of body. In

spite of repeated examination of the material from the cruise of the "Margrethe", I have not succeeded in finding a single specimen. I have had occasion to examine a large specimen of *Arg. aculeatus* from the Indian Ocean, preserved in the Zoological Museum at Copenhagen (Lütken 1892).

The area of distribution of the species in the Atlantic lies somewhat to the southward; a single specimen has, however, been found washed up on the coast of Norway (Collett 1903). During the Atlantic cruise of the "Michael Sars" in 1910, it was found in the southern part of the Bay of Cadiz, round the Canaries and the Azores, and in the vicinity of Lat. 40° N. Long. 50° W. In all, 50 specimens were taken. (Murray and Hjort 1912). It may appear surprising that the species should be entirely lacking in our material; as a matter of fact, however, neither the area investigated nor the implements employed by the "Margrethe" were identical with those of the "Michal Sars", which fact may possibly serve to explain the failure of the former vessel to secure specimens. The "Michael Sars" fished, on the whole, in deeper strata than the "Margrethe". Possibly also, the somewhat later season of the year may count for something here.

STERNOPTYX DIAPHANA Hermann.

Sternoptyx diaphana Hermann 1781; Cuvier 1829; Cuvier et Valenciennes 1828—49; Lowe 1850; Günther 1864, 1887; Jordan 1887; Vaillant 1888; Goode and Bean 1896; Gilbert 1897, 1905; Jordan and Evermann 1896; Alcock 1899; Brauer 1906; Zugmayer 1911; Holt and Byrne 1913.
Sternoptyx diaphanus Collett 1896.

Brr. 5, P. 10, V. 5, D. 9—10 (11?), A. 13—14.

Material. The material embraces in all 49 specimens of this species taken partly during the cruise of the "Thor" to the Mediterranean (15) and partly during that of the "Margrethe" in the Atlantic 1913 (34). *Sternoptyx diaphana* is of a so distinctive appearance as to render confusion with the *Argyropelecus* species practically impossible, even in the case of quite young specimens, provided the first light organs are present. Brauer (1906) gives a detailed description of the larvæ of this species.

Distribution. *Sternoptyx diaphana*, which is not known from the Mediterranean, is found in the Atlantic, the Pacific, and the Indian Ocean, but evidently requires a fairly high temperature. The most northerly finds across the Atlantic fall to the following localities: Lat. 46° N, Long. 24° W (Lütken 1892), Lat. 48° N, Long. 37° W. (Murray and Hjort 1912) and off the east coast of North America about 44° N (Goode and Bean 1896). Brauer (1906) gives a record of the finds made up to that date; since then, the German South Polar (Antarctic) Expedition (1901—1903) has encountered it in the Atlantic from Lat. 17° N. to Lat. 23° S. (Pappenheim). On the cruise of the "Michael Sars" in 1910, 101 specimens were taken, only two of these being found north of the Azores (Murray and Hjort 1912), in addition to which, a number were taken in the Bay of Cadiz and round the Azores in the course of the investigations made by the Prince of Monaco in those waters (Zugmayer 1911). Finally, a single specimen has been found outside the Bay of Biscay (Holt and Byrne 1913).

The material from the "Thor" was obtained at two stations (St. 65, St. 91) in the Bay of Cadiz. Strange to say, the positions of these stations are identical, the one being made during the winter cruise, the other during the summer cruise to the Mediterranean. The remainder of the material was procured during the cruise of the "Margrethe" in the Atlantic in 1913; only a single specimen was taken north of the Azores. (Chart VI). The average sizes at the stations made by the "Thor" are 12 mm. (February) and 8 mm. (June). The largest specimen, measuring 30 mm., was the single one taken by the "Margrethe" N. of the Azores. South-west of the Azores we have St. 1015, with an average size of 16 mm. The average sizes for all the 5 stations west of this ranging from 6 to 9 mm. These figures exhibit a remarkable similarity to those noted in the case of *Arg. hemigymnus*.

Chart VI. *Sternoptyx diaphana* (Hermann). ● positive stations, — negative stations.

A characteristic feature in the case of *Sternoptyx diaphana* is the fact that it is not hitherto known to have been washed ashore on the coasts of northern Europe. With regard to this, COLLETT (1896) observes: "il ne paraît pas avoir été rencontré près de terre le long des côtes ouest de l'Europe, et jamais le Gulf-Stream ne l'a apporté, comme *Argyropelecus olfersi* jusque sur les côtes de la Norvège". It has, however, frequently been found floating at the surface, and its northernmost limit of occurrence falls not far south of that for *Arg. olfersi*. With regard to vertical distribution, the paucity of material available precludes any definite statement as to this.

The lengths of wire employed were as follows: 300 meters, 1 haul, 1000 m., 6 hauls, 1600 m., 2 hauls, 2000 m., 1 haul, 2500 m., 1 haul, 4000 m., 1 haul. *Sternoptyx diaphana* is presumed (MURRAY and HJORT 1912) to live somewhat deeper down than *Argyropelecus*, which does not apparently quite agree with our investigations when it was taken on 300 meters of wire; this, moreover, in the middle of the day. Otherwise, we have only two positive hauls with 1600 meters of wire.

The lowest surface temperature recorded is 15°.78 at St. 65 (February).

III. SUMMARY.

The material collected by the Danish investigations in the Atlantic and the Mediterranean for the genera *Argyropelecus* and *Sternoptyx* comprises a total of 1677 specimens, distributed as follows:

Argyropelecus affinis Garman	7	specimens
— *hemigymnus* Cocco	1559	—
— *olfersi* Cuvier	62	—
Sternoptyx diaphana Hermann	49	—

Of these species, only *Arg. hemigymnus* is found both in the Atlantic and the Mediterranean; the others, all of which were found in the Bay of Cadiz, are apparently unable to thrive under the higher degree of salinity which prevails in the Mediterranean.

Argyropelecus affinis Garman, was found only in the Bay of Cadiz, this being the most northerly of all localities in the Atlantic where it has been encountered. The Danish finds may therefore doubtless be taken as marking the northernmost limit of occurrence for this southerly species.

Argyropelecus hemigymnus Cocco, was found almost everywhere throughout the Mediterranean. It lives only in waters with great depth to bottom, never having been taken within the 300 meter line, and only exceptionally within 500 m. The maximum for vertical distribution probably lies between 300—600 meters depth (600—1000 m. of wire). At night, it may be taken comparatively near the surface, but deeper down during the day, its upper limit then being probably not higher than 150—200 meters below the surface (300 m of wire). The species has no sharply restricted spawning season in the Mediterranean, larval stages being encountered all the year round; the maximum here, however, probably falls about the month of April. In the Atlantic, the northernmost spawning limit of the species lies about Lat. 51° N, the ordinary limit of distribution however, lying considerably farther to the north (Lat. 62° N.). Quite exceptionally it may be washed ashore on the coasts of Iceland and Norway. It is found across the Atlantic from Lat. 20° N. to 40° N. In the northern part of the Atlantic it has its regular spawning time probably in late spring or early summer. In the Bay of Cadiz, larval stages are found in February, and there is here, as in the Atlantic S. of 40° N. probably no sharply restricted spawning time, the same being the case as regards the Mediterranean.

Argyropelecus olfersi Cuvier is a decidedly more oceanic species than *Arg. hemigymnus*, and was not found within the 1200 meter limit. The largest specimen hitherto known, measuring 96 mm. exclusive of caudal fin, was taken on board the Danish research steamer "Thor" in the Bay of Biscay. Its northernmost limit of ordinary occurrence lies about Lat. 51° N., the limit of spawning area somewhat farther to the south. Specimens may exceptionally be carried as far as the coasts of Iceland and Norway. Its vertical distribution corresponds in all essentials to that of *Arg. hemigymnus*. Judging from the present material, its vertical range of occurrence during the daytime would appear to lie between 3—400 meters (6—800 m. of wire) below the surface.

Sternoptyx diaphana Hermann is a more southerly species. The most northerly point at which it has been taken by the Danish investigations lies about Lat. 42° N. It has been found from the Bay of Cadiz across the Atlantic between Lat. 20° N. and 40° N, as far as Long. 58° W. The material, which was collected during the autumn, W. of Long. 40° W, consists exclusively of small sizes.

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Record of the hauls of Argyropelecus and Sternoptyx made by the "T

Station Nr.	Position Lat. N.	Position Long.	Date	Hour	Depth Meters	Tempe-rature Surface	Salinity ‰ Surface	Salinity ‰ 400 Met.	Duration of haul in minutes	Wire out Meters	Gear	Argyropelecus affinis. Garm Sizes (m/m) < 10	10 -20	20—30	30 40
4	45°20′	W 7°42′	1/12 08	11^{45} a. m.	> 4000	15°6	"	"	30	1500	c. 130	..	..	..	..
10	37°21′	E 16°45′	15/12 08	3^{45} p. m.	> 2100	16°5	"	"	60	600	Y 200	..	..	..	..
"	"	"	"	9^{30} a. m.	"	"	"	"	60	1200	Y 200	..	..	..	..
11	36°57′	18°16′	16/12 08	4^{00} a. m.	> 3700	16°6	38.06	38.78	60	25	Y 200	..	..	..	..
"	"	"	"	7^{00} a. m.	"	"	"	"	120	300	Y 200	..	..	..	..
"	"	"	"	9^{30} a. m.	"	"	"	"	180	1000	Y 200	..	..	..	..
12	39°34′	17°17′	19/12 08	2^{15} p. m.	1060	14°2	"	"	45	1000	Y 200	..	..	..	..
13	39°43′	17°30′	19/12 08	8^{50} p. m.	> 1200	14°4	"	"	60	65	Y 200	..	..	..	..
"	"	"	"	5^{35} p. m.	"	"	"	"	60	300	Y 200	..	..	..	..
"	"	"	"	7^{05} p. m.	"	"	"	"	60	1000	Y 200	..	..	..	..
14	41°24′	17°45′	21/12 08	8^{30} a. m.	1125	13°7	"	"	90	1000	Y 200	..	..	..	..
15	40°04′	19°06′	22/12 08	8^{00} a. m.	1000	15°2	38.24	38.73	60	1400	Y 200	..	..	..	..
24	40°14′	12°23′	16/1 09	2^{10} p. m.	> 3700	14°15	37.94	38.64	60	600	Y 200	..	..	..	..
"	"	"	"	11^{15} p. m.	"	"	"	"	240	1600	Y 200	..	..	..	..
28	40°53′	13°43′	19/1 09	5^{00} p. m.	600	13°2	"	"	60	1000	Y 200	..	..	..	..
29	40°47′	12°55′	20/1 09	9^{30} p. m.	1550	14°2	"	"	60	600	Y 200	..	..	..	..
"	"	"	"	2^{15} p. m.	"	"	"	"	60	1650	Y 200	..	..	..	..
31	41°44′	10°52′	22/1 09	3^{00} a. m.	1420	13°0	38.04	38.64	30	600	Y 200	..	..	..	..
"	"	"	"	1^{20} a. m.	"	"	"	"	60	1400	Y 200	..	..	..	..
35	43°36′	7°36′	29/1 09	6^{40} a. m.	> 2000	12°8	38.04	38.48	60	200	Y 200	..	..	..	..
"	"	"	"	11^{35} a. m.	"	"	"	"	120	1600	Y 200	..	..	..	..
"	"	"	"	3^{45} a. m.	"	"	"	"	90	2500	C 200	..	..	..	..
39	39°41′	10°02′	1/2 09	0^{30} p. m.	1750	13°2	37.97	38.64	120	1000	Y 200	..	..	..	..
45	37°28′	8°18′	6/2 09	11^{25} p. m.	> 2150	14°0	37.00	38.62	30	300	Y 200	..	..	..	..
46	37°17′	6°00′	7/2 09	7^{30} p. m.	> 1930	14°2	36.92	38.46	30	300	Y 200	..	..	..	..
"	"	"	"	6^{35} p. m.	"	"	"	"	30	600	Y 200	..	..	..	..
47	36°55′	3°12′	10/2 09	11^{05} p. m.	> 2000	14°5	36.76	38.40	30	300	Y 200	..	..	..	..
50	37°02′	1°17′	17/2 09	2^{40} a. m.	> 2000	13°4	37.39	38.40	30	300	Y 200	..	..	..	..
"	"	"	"	4^{10} a. m.	"	"	"	"	30	600	Y 200	..	..	..	..
"	"	"	"	5^{30} a. m.	"	"	"	"	60	1600	Y 200	..	..	..	..
51	36°27′	W 0°37′	18/2 09	0^{50} a. m.	> 2000	14°0	36.69	38.42	30	300	Y 200	..	..	..	..
53	36°13′	1°28′	18/2 09	5^{15} p. m.	> 2000	13°87	37.25	38.42	90	2600	C 200	..	..	..	..
59	36°02′	4°24′	21/2 09	1^{40} a. m.	1260	14°5	36.44	38.39	30	500	Y 200	..	..	..	..
"	"	"	"	2^{40} a. m.	"	"	"	"	60	1200	Y 200	..	..	..	..
61	35°57′	5°35′	21/2 09	3^{25} p. m.	740	14°65	36.51	38.37	60	600	Y 200	..	..	..	..
63	35°50′	6°03′	22/2 09	1^{45} a. m.	490	14°95	36.27	38.03	60	600	Y 200	..	..	..	..
65	35°53′	7°26′	24/2 09	6^{30} p. m.	1300	14°0	36.36	35.66	60	65	Y 200	..	..	..	..
"	"	"	"	0^{30} p. m.	"	"	"	"	120	1600	Y 200	..	..	1	..
66	36°16′	6°52′	25/2 09	5^{15} a. m.	735	15°78	36.26	35.66	120	600	Y 200	..	..	..	..
"	"	"	"	8^{30} a. m.	"	"	"	"	120	1200	Y 200	..	..	..	1
68	36°39′	7°21′	27/2 09	7^{00} p. m.	550	14°8	36.24	35.57	30	65	Y 200	..	..	..	..
"	"	"	"	5^{55} p. m.	"	"	"	"	45	800	Y 200	..	..	..	..
69	36°13′	9°44′	28/2 09	9^{00} p. m.	> 3500	14°79	36.26	35.68	60	600	Y 200	..	..	..	..
"	"	"	"	6^{30} p. m.	"	"	"	"	60	3000	Y 200	..	..	..	..
74	44°21′	7°55′	9/3 09	1^{30} a. m.	> 3000	11°5	35.62	35.57	60	65	Y 200	..	..	..	..
"	"	"	"	0^{10} a. m.	"	"	"	"	60	600	Y 200	..	..	..	..
76	47°01′	5°48′	10/3 09	2^{40} p. m.	> 1200	11°4	35.52	35.46	60	1600	Y 200	..	..	..	..
89	36°28′	8°22′	18/6 10	4^{10} a. m.	1310	18°98	36.38	35.62	30	1000	Y 200	..	..	..	..
91	35°53′	7°26′	18/6 10	5^{25} p. m.	1225	19°08	36.47	35.70	60	1600	Y 200	..	..	..	1
106	36°33′	2°00′	25/6 10	2^{30} a. m.	1100	20°92	36.56	38.31	30	65	Y 200	..	..	..	..
"	"	"	"	1^{45} a. m.	"	"	"	"	30	300	Y 200	..	..	..	..

:he Mediterranean and adjacent parts of the Atlantic, 1908—10.

yropelecus hemigymnus, Cocco. Sizes (m/m)				Argyropelecus olfersi, Cuvier. Sizes (m/m)									Sternoptyx diaphana, Hermann. Sizes (m/m)				
10–20	20–30	30–40	40–50	< 10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	< 10	10–20	20–30	30–40	40–50
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
15	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	4	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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2	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	4	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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11	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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37	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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7	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	7	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	8	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	10	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	3	1	..	..	..	..	..	..	..	..	..	..	..	..	4	5	..	..	..
89	15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	4	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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3	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
1	5	..	..	..	..	3	..	..	..	..	..	..	..	..	6	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Record of the hauls of Argyropelecus and Sternoptyx made by the "The

Station Nr.	Position Lat. N.	Position Long.	Date	Hour	Depth Meters	Temperature Surface	Salinity ‰ Surface	Salinity ‰ 40) Met.	Duration of haul in minutes	Wire out Meters	Gear	Argyropelecus affinis, Garman Sizes (m/m) < 10	10–20	20–30	30–40
		W													
106	36°33′	2°00′	25/6 10	0^{20} a. m.	1100	20°92	36.56	38.31	60	1200	Y 200	..	..	..	..
107	36°18′	1°14′	25/6 10	9^{05} a. m.	2250	21°26	36.92	38.39	30	300	Y 200	..	..	..	..
"	"	"	"	7^{30} a. m.	"	"	"	"	60	2000	Y 200	..	..	..	..
108	36°03′	0°27′	26/6 10	0^{40} a. m.	> 2400	21°00	36.53	38.39	60	2000	Y 200	..	..	..	..
		E													
112	36°56′	2°15′	27/6 10	0^{15} a. m.	2700	21°96	37.19	38.39	30	300	Y 200	..	..	..	..
115	38°17′	4°11′	28/6 10	11^{20} p. m.	2800	21°92	37.30	38.46	30	300	Y 200	..	..	..	..
"	"	"	"	0^{30} a. m.	"	"	"	"	60	2000	Y 200	..	..	..	..
120	42°31′	7°41′	1/7 10	8^{50} p. m.	ca. 2700	18°36	38.28	38.39	30	300	Y 200	..	..	..	..
122	43°50′	8°34′	2/7 10	5^{30} a. m.	1285	19°46	38.30	38.46	30	1200	Y 200	..	..	..	..
123	44°14′	8°55′	3/7 10	0^{05} a. m.	ca. 700	20°26	37.90	38.49	30	300	Y 200	..	..	..	..
125	43°54′	9°13′	9/7 10	9^{45} p. m.	1082	19°06	38.35	38.46	30	300	Y 200	..	..	..	..
129	40°05′	11°31′	12/7 10	8^{00} p. m.	3420	21°76	37.95	38.62	30	600	Y 200	..	..	..	..
"	"	"	"	4^{20} a. m.	"	"	"	"	60	1000	Y 200	..	..	..	..
"	"	"	"	3^{00} p. m.	"	"	"	"	120	3500	C 200	..	..	..	..
131	38°36′	11°00′	13/7 10	10^{40} a. m.	915	21°48	37.97	38.57	60	1000	Y 200	..	..	..	..
133	38°18′	9°59′	14/7 10	10^{15} p. m.	602	21°82	38.01	38.49	30	300	Y 200	..	..	..	..
"	"	"	"	9^{20} p. m.	"	"	"	"	30	600	Y 200	..	..	..	..
138	37°37′	11°25′	19/7 10	7^{40} p. m.	788	23°50	37.57	38.68	60	1000	Y 200	..	..	..	..
139	37°57′	11°54′	20/7 10	3^{40} a. m.	580	21°96	37.39	37.68	60	800	Y 200	..	..	..	..
144	34°31′	18°40′	24/7 10	3^{45} a. m.	3340	26°05	38.49	38.77	60	2000	Y 200	..	..	..	..
"	"	"	"	6^{20} a. m.	"	"	"	"	60	4000	C 200	..	..	..	..
147	31°35′	19°02′	25/7 10	11^{35} p. m.	993	25°20	38.21	38.73	30	25?	Y 200	..	..	..	..
"	"	"	26/7 10	1^{10} a. m.	"	"	"	"	60	1000	Y 200	..	..	..	..
152	33°11′	21°44′	28/7 10	0^{30} a. m.	> 2200	23°9	38.62	38.77	60	1000	Y 200	..	..	..	..
154	32°10′	24°46′	29/7 10	4^{30} a. m.	365	24°35	38.68	"	30	300	Y 200	..	..	..	..
156	32°16′	26°03′	30/7 10	3^{00} a. m.	ca. 3200	25°49	39.04	38.82	30	600	Y 200	..	..	..	..
"	"	"	"	0^{40} a. m.	"	"	"	"	60	1000	Y 200	..	..	..	..
160	35°59′	28°14′	1/8 10	3^{35} a. m.	> 1000	24°72	39.22	38.77	60	1000	Y 200	..	..	..	..
"	"	"	"	3^{30} p. m.	2980	26°28	"	"	60	4000	C 200	..	..	..	..
163	37°52′	26°22′	3/8 10	0^{05} a. m.	1170	26°6	39.13	38.83	30	1000	Y 200	..	..	..	..
182	38°13′	24°48′	14/8 10	11^{40} p. m.	500	25°5	36.64	38.82	30	600	Y 200	..	..	..	..
184	38°10′	22°33′	17/8 10	2^{45} a. m.	842	23°9	38.15	38.57	30	1000	Y 200	..	..	..	..
186	37°57′	19°51′	18/8 10	0^{45} a. m.	> 3000	24°0	38.21	38.77	30	1200	Y 200	..	..	..	..
187	37°54′	18°02′	18/8 10	6^{40} p. m.	> 2500	25°05	38.40	38.77	30	1000	Y 200	..	..	..	..
189	37°44′	15°58′	19/8 10	9^{30} a. m.	< 2000	25°9	38.30	38.68	30	1000	Y 200	..	..	..	..
192	38°07′	15°35′	20/8 10	10^{50} p. m.	652	23°5	38.30	38.69	30	600	Y 200	..	..	..	..
194	38°33′	15°29′	21/8 10	6^{00} a. m.	1140	25°4	37.92	38.64	30	1200	Y 200	..	..	..	..
199	39°32′	10°49′	25/8 10	9^{00} p. m.	ca. 2700	24°9	38.24	38.64	15	25	Y 200	..	..	..	..
"	"	"	"	10^{10} p. m.	"	"	"	"	30	1000	Y 200	..	..	..	..
204	38°52′	7°43′	27/8 10	4^{45} a. m.	> 1000	23°5	38.19	38.50	30	1000	Y 200	..	..	..	..
206	39°32′	5°15′	28/8 10	1^{40} a. m.	ca. 2860	24°9	37.39	38.39	45	1000	Y 200	..	..	..	..
"	"	"	"	3^{05} a. m.	"	"	"	"	45	2000	Y 200	..	.	..	..
209	40°34′	3°03′	29/8 10	6^{00} a. m.	> 2000	24°5	38.10	38.35	45	1000	Y 200	..	..	..	..
"	"	"	"	7^{25} a. m.	"	"	"	"	45	2000	Y 200	..	..	..	..
210	41°10′	2°23′	30/8 10	3^{25} a. m.	780	24°0	37.90	38.41	30	600	Y 200	..	..	..	..
218	36°54′	2°57′	2/9 10	2^{45} a. m.	ca. 2000	23°5	36.74	38.41	30	300	Y 200	..	..	..	..
		W													
222	35°53′	0°57′	4/9 10	11^{20} p. m.	ca. 2000	22°88	36.64	38.40	30	300	Y 200	..	..	..	..
223	36°13′	1°28′	5/9 10	4^{50} a. m.	> 2000	22°9	36.40	38.40	30	300	Y 200	..	..	..	..
228	36°02′	5°06′	7/9 10	0^{50} a. m.	> 800	18°42	36.45	36.40	30	1200	Y 200	..	..	..	..
231	35°56′	7°16′	9/9 10	2^{15} a. m.	> 950	21°30	36.42	35.61	30	1200	Y 200	..	1	2	..
232	36°28′	9°06′	9/9 10	10^{35} p. m.	ca. 3500	22°5	36.58	35.61	30	1000	Y 200	..	..	..	..
234	38°10′	9°20′	10/9 10	11^{20} p. m.	910	19°3	35.91	35.68	30	1000	Y 200	..	..	..	..
240	44°34′	8°16′	15/9 10	9^{40} p. m.	> 4000	17°34	35,75	"	30	1000	Y 200	..	..	..	..

Mediterranean and adjacent parts of the Atlantic, 1908—10 (continued).

Argyropelecus hemigymnus, Cocco. Sizes m/m				Argyropelecus olfersi, Cuvier. Sizes (m/m)									Sternoptyx diaphana, Hermann. Sizes (m/m)				
10–20	20–30	30–40	40–50	< 10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	< 10	10–20	20–30	30–40	40–50
2	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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1	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	3	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	4	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	7	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	10	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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9	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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2	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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5	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	12	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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3	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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Record of the hauls of Argyropelecus and Sternop

Station Nr.	Position Lat. N.	Position Long. W.	Date	Hour	Depth Meters	Temperature Surface	Salinity ‰ Surface	Salinity ‰ 400 Met.	Duration of haul in minutes	Wire out Meters	Gear	Argyropelecus affinis, Garman Sizes (m/m) <10	10–20	20–30	30–40
99.04	61°15′	9°35′	22/5 04	"	872	"	"	"	60	1700	Y 200	..	..	..	..
61.05	61°11′	11°00′	28/5 05	"	963	8°87	"	"	60	900	Y 200	..	..	..	..
63.05	59°49′	8°58′	30/5 05	6^{00} a. m.	1150	9°19	35.30	35.30	60	1200	Y 200	..	..	..	..
64.05	59°17′	7°29′	30/5 05	9^{30} p. m.	895	9°88	35.41	35.39	60	1000	Y 200	..	..	..	..
71.05	57°47′	11°33′	7/6 05	"	1985	10°53	35.31	"	60	1500	Y 200	..	..	..	..
72.05	57°52′	9°53′	8/6 05	2^{15} p. m.	1550	10°72	"	"	120	1500	Y 330	..	..	..	..
82.05	51°00′	11°43′	14/6 05	0^{45} p. m.	1350	13°79	35.46	"	120	1200	Y 330	..	..	..	..
165.05	60°00′	10°35′	29/8 05	8^{00} p. m.	1050	"	"	"	60	1000	Y 200	..	..	..	..
36.06	44°21′	2°37′	10/5 06	9^{05} a. m.	1035	"	"	"	120	800	Y 330	..	..	..	..
"	"	"	"	9^{55} a. m.	1125	"	"	"	120	1250	Y 330	..	..	..	..
42.06	43°31′	2°13′	15/5 06	9^{20} a. m.	348	"	"	"	60	400	Y 200	..	..	..	..
52.06	48°42′	12°20′	21/5 06	0^{25} a. m.	1900	11°71	"	"	120	300	Y 330	..	..	..	..
61.06	51°04′	11°39′	31/5 06	6^{50} p. m.	1450	11°55	"	"	120	900	Y 330	..	..	..	..
64.06	49°17′	14°03′	5/6 06	10^{30} p. m.	2140	13°04	35.57	"	120	300	Y 330	..	..	..	..
67.06	48°29′	14°15′	7/6 06	5^{00} a. m.	> 4000	13°30	35.50	"	120	1700	Aa. T	..	..	..	..
73.06	48°43′	12°05′	9/6 06	4^{50} a. m.	1342	13°25	35.57	"	60	400	Aa. T	..	..	..	..
74.06	49°23′	12°13′	10/6 06	6^{35} a. m.	1275	14°78	35.59	"	60	2000	Y 330	..	..	..	..
75.06	49°20′	12°39′	10/6 06	11^{20} p. m.	1520	14°41	"	"	120	400	Aa. 2	..	..	..	..
76.06	49°27′	13°33′	11/6 06	6^{15} p. m.	> 2600	14°5	35.59	"	120	800	Y 200	..	..	..	..
"	"	"	"	2^{40} a. m.	"	"	"	"	120	200	Y 330	..	..	..	..
"	"	"	"	3^{00} p. m.	"	"	"	"	120	2800	Y 200	..	..	..	..
80.06	51°34′	11°50′	16/6 06	6^{30} p. m.	1140	13°04	35.52	"	120	1200	Y 200	..	..	..	..
89.06	55°45′	9°35′	23/6 06	7^{40} p. m.	1600	"	"	"	120	350	Y 200	..	..	..	..
90.06	55°45′	9°30′	24/6 06	0^{50} a. m.	910	"	"	"	30	800	Y 200	..	..	..	..
91.06	56°02′	8°03′	24/6 06	9^{50} a. m.	140	"	"	"	30	200	Y 200	..	..	..	..
175.06	51°11′	11°41′	30/8 06	7^{00} p. m.	1050	16°38	35.37	"	60	1050	Y 330	..	..	..	..
178.06	48°04′	12°40′	2/9 06	7^{05} a. m.	4000	18°40	35.55	"	60	1000	Y 330	..	..	..	..
"	"	"	"	9^{05} a. m.	"	"	"	"	120	1800	Y 330	..	..	..	..
179.06	47°20′	12°23′	3/9 06	0^{00} a. m.	> 4000	19°38	35.61	"	120	600	Y 330	..	..	..	..
"	"	"	"	3^{40} a. m.	"	"	"	"	120	1800	Y 330	..	..	..	..
181.06	49°22′	12°52′	4/9 06	9^{10} a. m.	1350	17°83	"	"	60	600	Y 330	..	..	..	..
"	"	"	"	10^{35} a. m.	"	"	"	"	60	1800	Y 330	..	..	..	..
182.06	50°11′	12°05′	11/9 06	6^{45} p. m.	> 2200	17°62	35.52	"	120	600	Y 330	..	..	..	..
185.06	51°56′	11°55′	7/9 06	1^{45} p. m.	650	16°14	"	"	60	900	Y 330	..	..	..	..
"	"	"	"	6^{45} p. m.	640	"	"	"	120	900	Y 330	..	..	..	..
186.06	50°06′	11°06′	8/9 06	8^{25} p. m.	600	17°22	35.48	"	60	300	Y 330	..	..	..	..
190.06	46°30′	7°00′	11/9 06	8^{25} a. m.	2700	18°82	35.64	"	150	2700	Y 330	..	..	..	..

e by the "Thor" in the Atlantic, 1904—06.

opelecus hemigymnus, Cocco. Sizes (m/m)				Argyropelecus olfersi, Cuvier. Sizes (m/m)										Sternoptyx diaphana, Hermann. Sizes (m/m)				
10–20	20–30	30–40	40–50	< 10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	< 10	10–20	20–30	30–40	40–50
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3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.	..
2	6	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	.
..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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1	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	1	..	..	..	1	2	1	..	..	..	..	..	..	..	..	..	..	..
11	54	13	..	..	..	2	3	1	..	..	..	..	..	..	.	..	..	..
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3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
1	7	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	4	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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6	8	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
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3	22	3	..	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..
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2	5	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	.
..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
3	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	4	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
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Record of the hauls of Argyropelecus and Sternop

Station Nr.	Position Lat. N.	Position Long. W.	Date	Hour	Depth Meters	Temperature Surface	Salinity ‰ Surface	Salinity ‰ 400 Met.	Duration of haul in minutes	Wire out Meters	Gear	Argyropelecus affinis, Garman Sizes (m/m) < 10	10–20	20–30	30–40
1002	57°27′	20°07′	19/7 13	2⁰⁰ a. m.	"	12°0	"	"	240	1000	P 150	..	..	..	..
1008	47°56′	31°31′	6/8 13	0¹⁵ a. m.	"	14°5	"	"	240	300	P 150	..	..	..	..
1011	42°38′	30°42′	13/8 13	0³⁰ a. m.	"	"	"	"	240	1000	P 100	..	..	..	..
"	"	"	"	"	"	"	"	"	240	2500	Aa. 200	..	..	..	..
1015	31°38′	33°06′	28/8 13	1³⁰ a. m.	"	"	"	"	240	300	P 150	..	..	..	.
"	"	"	"	"	"	"	"	"	240	1000	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	2000	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	3000	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	4000	Aa. 200	..	..	..	..
1017	28°00′	37°57′	3/9 13	0³⁰ a. m.	"	25°0	"	"	240	300	S 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	600	S 150	..	..	..	..
1018	28°37′	39°36′	6/9 13	0³⁰ a. m.	"	25°5	"	"	240	150	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	600	S 150	..	..	..	..
1019	31°06′	41°45′	8/9 13	0³⁰ a. m.	"	24°0	"	"	240	300	S 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	600	S 150	..	..	..	..
1021	37°54′	46°47′	14/9 13	0³⁰ a. m.	"	23°9	"	"	240	150	S 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	600	P 150	..	..	..	..
1024	42°19′	50°22′	20/9 13	0¹⁵ a. m.	"	19°4	"	"	240	300	S 150	..	..	..	..
1026	39°14′	54°04′	24/9 13	2⁰⁰ p. m.	"	24°0	"	"	240	600	S 150	..	..	..	..
1030	35°31′	55°58′	1/10 13	8²⁰ p. m.	"	24°2	"	"	240	600	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	1000	P 150	..	..	..	..
1031	33°18′	56°03′	3/10 13	8⁰⁰ p. m.	"	25°0	"	"	240	150	C 200	..	..	..	..
1035	27°39′	52°50′	9/10 13	8⁴⁵ p. m.	"	26°0	"	"	240	300	S 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	600	P 100	..	..	..	..
"	"	"	"	"	"	"	"	"	240	1000	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	2000	P 100	..	..	..	..
1036	27°24′	52°40′	10/10 13	0⁵⁰ p. m.	"	27°40	"	"	240	300	S 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	600	P 100	..	..	..	..
"	"	"	"	"	"	"	"	"	240	1000	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	2000	P 100	..	..	..	..
1062	22°39′	46°15′	1/12 13	8¹⁵ p. m.	"	24°8	"	"	240	600	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	1000	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	2000	P 150	..	..	..	..
1071	22°13′	58°36′	17/12 13	0⁰⁰ a. m.	"	"	"	"	240	600	P 150	..	..	..	..
"	"	"	"	"	"	"	"	"	240	1000	C 200	..	..	..	..

e by the "Margrethe" in the Atlantic, 1913.

opelecus hemigymnus, Cocco. Sizes (m/m)				Argyropelecus olfersi, Cuvier. Sizes (m/m)										Sternoptyx diaphana, Hermann. Sizes (m/m)				
10–20	20–30	30–40	40–50	<10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	<10	10–20	20–30	30–40	40–50
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REPORT ON THE DANISH OCEANOGRAPHICAL EXPEDITIONS 1908-10
TO THE MEDITERRANEAN AND ADJACENT SEAS
Vol. II. Biology.

D. 1.

Isopoda, Tanaidacea, Cumacea, Amphipoda (excl. Hyperiidea)

by

K. Stephensen.

With 33 figures in the text.

Published April 15. 1915.

The present work, being Part I of the Report on the Crustacea of the Expedition, comprises Isopoda, Tanaidacea, Cumacea and Amphipoda, excl. Hyperiidea. These last have, for practical reasons, not been included here, but will appear as Part II of the Crustacea. A great deal of the material has, it is true, already been classified, but the descriptions and drawings of the new or little known species are not yet completed, and the total material of the Hyperiidea is so enormous (abt. 3000 tubes) that its inclusion here would probably involve the postponement of publication of the present groups for at least a year.

As will be seen, from Dr. Schmidt's introductory remarks on the material (Vol. I, p. 22—24), and from the list of stations (Vol. I, p. 25—49), the expedition was based on plankton investigations, and dredgings were only occasionally made. The groups here dealt with consist mainly of bottom organisms, and the result will thus necessarily be but poor. I have thought it advisable to call attention to this point, lest the present work should be taken as a typical example of the methods of work employed by the expedition, which is very far from being the case. Not until the reports on the plankton have been published will it be possible to form any idea as to the quality of the work done by the expedition.

The geographical area to be dealt with in the works on the Crustacea embraces the Mediterranean with adjacent waters, bounded approximately by lat. 50° N., long. 30° W. and lat. 30° N. Only where quite exceptional circumstances rendered it advisable have I included species found outside this field.

The fact that most of the species here treated are represented only by single or very few specimens renders it almost impossible for me to furnish those biological details, the procuring of which otherwise forms one of the principal objects of the expedition. And indeed the groups here dealt with should, in order to rightly estimate their value, rather be considered as the "refuse" of the expedition. This refuse is, however, by no means lacking in interest, proving as it does, *inter alia*, that the deeper portions of the Mediterranean still contain a number of unknown species.

The present work includes altogether 80 species, of which 13 n. spp., viz:

25 Isopoda, of which 4 n. spp.	39 Gammaridea of which 5 n. spp.
5 Tanaidacea „ „ 1 „ „	1 Caprellid.
10 Cumacea „ „ 3 „ „	

Of the 5 new Gammaridea, 2 must be regarded as types representing new families.

The species are as follows: (those marked * being new)

Isopoda.

1. Flabellifera.

Fam. Anthuridæ. Paranthura nigropunctata Lucas.
Fam. Gnathiidæ. *Gnathia Thori n. sp.
Fam. Ægidæ. Ægа incisa Schiødte & Meinert.
Rocinela Danmoniensis Leach.
Syscenus infelix Harger.
Fam. Cirolanidæ. Cirolana borealis Lilljeb.
— Cranchii Leach.
Eurydice spinigera H. J. Hansen.
— truncata Norman.
— Grimaldii Dollfus.
Fam. Cymothoidæ. 2 spp. juv.
Fam. Sphæromidæ. Cymodocea truncata Leach.

2. **Valvifera.**

Fam. Idoteidæ. Idotea metallica Bosc.
— baltica Pallas.
Stenosoma capito Rathke.
— acuminatum Leach.
— appendiculatum Risso.
Fam. Arcturidæ. *Astacilla (?) Bonnierii n. sp.
— Deshayesii Lucas.

3. **Asellota.**

Fam. Ianiridæ. *Ianirella Bonnierii n. sp.
Fam. Desmosomidæ *Desmosoma chelatum n. sp.
Fam. Munnopsidæ. Munneurycope Tjalfiensis K. St.

4. **Epicaridea.**

Fam. Dajidæ. Holophryxus Richardi Koehler.
Heterophryxus appendiculatus G. O. Sars.

Tanaidacea.

Fam. Apseudidæ. *Apseudes graciloides n. sp.
— retusifrons Richardson.
— grossimanus Norman & Stebb.
— echinatus G. O. Sars.
Fam. Tanaidæ. Tanais robustus Moore.

Cumacea.

Fam. Vaunthompsoniidæ. ?Bathycuma longicaudatum Calman.
Fam. Bodotriidæ. Cyclaspis longicaudata G. O. Sars.
Fam. Platysympodidæ. Platysympus typicus G. O. Sars.
Fam. Diastylidæ. *Diastylis processifera n.sp.
* — Stebbingii n. sp.
Adiastylis longipes G. O. Sars.
Makrokylindrus Josephinæ G. O. Sars.
Fam. Procampylaspididæ. Procampylaspis armata Bonnier.
Fam. Campylaspididæ Campylaspis vitrea Calman.
* — horridoides n. sp.

Amphipoda.

1. **Gammaridea.**

Fam. Lysianassidæ. Trischizostoma nicæense Costa.
Lysianassa ceratina Walker.
Aristias tumidus H. J. H.
Ichnopus spinicornis Boeck.
*Hippomedon tunisiacus n. sp.
Katius obesus Chevreux.
Cyphocaris anonyx Boeck.
— Richardi Chevreux.
— Alicei Chevreux.
Metacyphocaris Helgæ Tattersall.
Crybelocephalus megalurus Tattersall.
*Thoriella islandica n. gen., n. sp.
*Chevreuxiella metopoides n. gen., n. sp.
Fam. Ampeliscidæ. Ampelisca diadema Costa.
— spinipes Boeck.
— brevicornis Costa.
?Haploops Dellavallei Chevreux.
Fam. Haustoriidæ. Urothoe pulchella Costa.
Fam. Colomastigidæ. Colomastix pusilla Grube.
Fam. Oediceratidæ. Monoculodes carinatus Bate.
Fam. Calliopiidæ. Stenopleura atlantica Stebbing.
Apherusa bispinosa Bate.
Fam. Atylidæ. Nototropis vedlomensis Bate & Westwood.
— guttatus Costa.
Fam. Eusiridæ. Eusirus longipes Boeck.
Fam. Gammaridæ. Mæra grossimana Mont.
* — Schmidtii n. sp.
Gammarus locusta L.
Fam. Dexaminidæ. Dexamine spinosa Mont.
Fam. Talitridæ. Hyale Grimaldii Chevreux.
— pontica Rathke.
— Schmidtii Heller.
? — camptonyx Heller.
Fam. Photidæ. 1 sp. indeterm.
Photis longicaudata Bate.
Eurystheus sp.
Fam. Ampithoidæ. Ampithoe vaillantii Lucas.
Fam. Corophiidæ. ?Ericthonius difformis M. Edw.
*Corophium rotundirostre n. sp.

2. **Caprellidea.**

Fam. Caprellidæ. Caprella acutifrons Latr. forma Andréæ P. Mayer.

Finally, I beg to express my best thanks to the authors who have aided me by forwarding works inaccessible to me by other means. To mention all by name would be to give a list including almost every living writer quoted in the following pages; I must, however, particularly thank the Rev. T. R. R. Stebbing. to whom I am further indebted for most valuable assistance rendered in other ways.

In this, as in my previous works, an asterisk * affixed to the title of any publication quoted denotes (where nothing is otherwise stated) the best description, with illustrations, of the species referred to.

All the figures are drawn by the author.

ISOPODA

1. Flabellifera.

Fam. ANTHURIDÆ.

Genus PARANTHURA.

PARANTHURA NIGROPUNCTATA, Lucas.

Anthura nigropunctata Lucas, Explor. Scient. de l'Algérie, Anim. Artic., 1849, vol. 1, p. 64, vol. 4, Pl. 5, fig. 9.

— — Heller, Verhandl. K. K. zool.-botan. Gesellsch. Wien, 1866, p. 732.

Paranthura costana Bate & Westwood, British sessile-eyed Crust., vol. 2, 1866, p. 165.

— — Dohrn, Bau u. Entwickl. d. Arthropoden, Heft 1, 1870, p. 91, Pl. 9.

— *nigropunctata* Norman & Stebbing, Isop. Lightning; Transact. Zool. Soc., vol. 12, pt. 4, 1886, p. 129, Pl. 26, fig. 2

St. 17. *37°49′ N., 23°27′ E.*, 55 m., 30-12-1908. Dredge. 1 spec. (♀), 11 mm.

This specimen agrees well with Dohrn's outline drawing, which is the best illustration extant; telson and uropoda are, however, slightly narrower in the specimen from the "Thor" than shown in Dohrn's figure.

Also found in: Algeria (Lucas); Adriatic (Heller); Guernsey (Norman and Stebbing); Jersey (Norman; Ann. Mag. Nat. Hist. ser. 7, vol. 20, 1907, p. 362).

Fam. GNATHIIDÆ.

As will be seen from the following, the material from the "Thor" contains one ♂ of genus *Gnathia*. This appears to belong to a new species; I have, however, in order to determine whether this was the case, collected all the works in which the *Gnathia* species were classed, going through for instance the whole of the Zoological Record. No complete synopsis having hitherto been published, I give my list below. Al. Brian has, it is true, (l. c. 1909, *vide* list of works *infra*) given a catalogue of works and species; this is however, not complete.

The genus *Gnathia*, with its great number of species, of which several are only known in the *Praniza* stage, needs to be thoroughly revised. Almost all the species in older works on the subject are described and drawn in a manner so schematic as doubtless to render them very difficult, if not impossible, of recognition.

For a brief historical survey of what is known as to the relation between *Gnathia* (*Anceus*) and *Praniza*, *vide* G. O. Sars, l. c. 1899, p. 51.

Where the titles of the works in the following list do not distinctly indicate the species treated, these are separately noted for each.

Reference list to Gnathiidæ.

Bate, Sp.: On Praniza and Anceus and their affinity to each other; Ann. Nat. Hist., ser. 3, vol. 2, 1858, p. 165—72, Pl. 6—7 (*Praniza Edwardsii, P. coerulata* Lilljb., *Anceus maxillaris*).

Bate, Sp. & Westwood: On the gen. Anceus (Anceus and Praniza auct.); Report 35. Meeting British Assoc. Adv. Sci., 1865, Notice p. 83.

— A History of the British sessile-eyed Crust., vol. 2, 1868 (*G. maxillaris* Mont., *G. fuscata* Johnston, *G. maculata* Westwood, *G. Edwardsii* Bate, *G. Halidayi* n. sp.)

Beddard: Prelim. Note Isop. Challenger; Proc. Zool. Soc. London, 1886, p. 120. (*A. bathybius* (*Bathygnathia b.*), *A. gigas* (*Eurneognathia g.*), *A. tuberculosus*, *A. latidens.*)

— Isop., Challenger-Report 1886.

Bonnier, J.: Rés. sci. de Camp. du »Caudan«; Ann. Univ. Lyon 1896, p. 571 (*G. propinqua*).

Brian, Al.: Nota di forme larvali dei Anceidi (*Gn. maxillaris* Sars) raccolte sui pesci; Revista mensile di Pesca e Idrobiologia, Napoli, Anno 11, 1909, No. 4—6.

Carus, V.: Prodromus faunæ Mediterraneæ, vol. 1, Stuttgart 1885.

Costa, O.[1]): Fauna del Regno di Napoli, Entomostraca 1840 (1852?) (*teste* Brian l. c. 1909).

Dohrn, A.: Entwickl. u. Organisation von *Praniza* (*Anceus*) *maxillaris;* Zeitschr. f. Wiss. Zool., vol. 20, 1870, p. 65—90, Pl. 6—8.

Dollfus, A.: Etude preliminaire des Gnathiidæ recuillis dans les camp. de l'Hirondelle et de la Princesse Alice; Bull. Soc. Zool. France, vol. 26, 1901, p. 239—46 (key to the genera; *G. Grimaldii, G. Richardii, G. robusta*

[1] This work I have not been able to consult.

Sars, *G. sp.?*, *Cœcognathia Sarsii*, *C.* (*Gnathia*) *stygia* G. O. S.).

Edwards, vide Milne-Edwards.

Grube, E.: Ueber die Beziehungen d. zehnfüss. Isopodengattungen Anceus u. Praniza zu einander; 41 Jahresber. d. Schles. Gesellsch. f. vaterl. Kultur, 1863, p. 64—65.

Hansen, H. J.: Malacostraca Groenlandiæ occ.; Vid. Meddel. Naturh. Foren. Kbhvn. 1887 (1888) (*G. cristata*).

Haswell: Revis. Austral. Isop.; Proc. Linn. Soc. N. S. Wales, vol. 9, 1884, pt. 3, p. 1005 (*G. ferox*).

Heller, C.: Carcinolog. Beiträge zur Fauna d. Adriat. Meeres; Verh. K. K. Zool.-botan. Gesellsch. Wien, vol. 16, 1866, p. 733.

Hesse, E.: Mém. sur la transformation des Pranizés en Ancées; Comptes Rendus de l'Acad. de Sci., vol. 46, 1858, p. 568, (a short report on Hesse l. c. 1863—1864).

— Mém. sur les Pranizés et les Ancées; Ann. Sci. Nat., Zool., ser. 4, vol. 9, 1863, p. 93—99 (a copy of Hesse 1864, but without descriptions of the species and figures).

— Mém. sur les Pranizés et les Ancées et sur les moyens curieux à l'aide desquels certains Crust. parasites assurent la conservation de leur espèce; Acad. des Sciences, Savants Etrangers, Paris, vol. 18, 1864, p. 1—74, 5 Pl.s (*A. asciaferus*, *A. brivatensis*, *A. erythrinus*, *A. falcarius*, *A. formica*, *A. lupi*, *A. manticorus*, *A. rapax*, *A. scarites*, *A. trigli*, *A. verrucosus*).

— Pranizés et Ancées nouveaux; Ann. Sci. Nat., Zool., ser. 5, vol. 19, 1874, 29 p. p., Pl. 21—22 (*A. balani*, *A. cotti bubali*, *A. platyrhynchus*, *A. scombri*, *A. surmuleti*, *A. uncifera*).

— [1]) Descript. d'un nouvel Ancée, l'Ancée du Congre, *Anceus Congeri*, faite sur des individus vivants; Revue Scient. Nat., vol. 4, 1875, p. 449—69, 1 Pl.

— Crust. rares ou nouveaux des Côtes de France, 36. Article, Descript. d'un nouvel Ancée, *Anceus Danielii;* Ann. Sci. Nat., Zool., ser. 6, vol. 17, 1884, No. 5—6, 11 pp.. Pl. 18.

Hodgson: Crust.; »Southern-Cross«-Exped. 1902 (*G. polaris* Hodg. = *G. antarctica* Studer).

— Isop.; National Antarct. Exped. 1901—04, Natural Hist., London, vol. 5, 1910 (*Euneogn. gigas* Beddard, *Gn. antarctica* Studer).

Johnston, G.: On *Praniza fuscata;* Loudon's Magazine of Nat. Hist., London, vol. 5, 1832, p. 520—22, fig. p. 521.

Korschelt u. Heider: Lehrbuch d. vergleich. Entwicklungsgesch., Spec. Theil, 2. Heft, 1892, p. 489.

Kossmann, R.: Zoolog. Ergebn. einer Reise in der Küstengebiete des Rothen Meeres, 2. Hälfte, Lief. 1, 1880, p. 105, Pl. 8 fig. 1—6 (*G. rhinobatis*).

Krøyer, H.: Grønlands Amfipoder; Kgl. Danske Vid. Selsk. naturvid. math. Afhandl., vol. 7, 1838, p. 301 (73), Pl. 4, fig. 20 (*Praniza Reinhardi*).

— Karcinolog. Bidrag; Naturhist. Tidsskrift, Ny Række, vol. 2, 1847, p. 388 (*G.* (*A.*) *elongata*).
Crust.; Gaimard, Voyage en Scand., Planches, 1846 (1849). (*G.* (*A.*) *elongata*).

Leach, W. E.[1]): Crustaceology; Edinburgh Encycl., vol. 7, 1813.

— A tabular view of the external characters of four classes of animals ....; Transact. Linn. Soc., London, Zool., vol. 11, 1815, p. 306—400.

[1] This work I have not been able to consult.

Lilljeborg, W.: Om Hafs-Crustaceer vid Kullaberg i Skåne; Öfvers. Kgl. Svenska Vet. Akad. Förh., Årgang 12, No. 3, 1852 (1855), p. 132 (*G. oxyuræa*, *P. coeruleata*).

Lucas: Hist. Nat. des Animaux artic. de l'Algérie, vol. 1, 1849, p. 87, No. 150 *bis*, No. 150 *ter* (*G. mauritanica*, *G. obesa*).

— Observations sur quelques espèces nouvelles de Crust. du Nord de l'Afrique; Ann. Soc. Entomol. France, ser. 2, vol. 7, 1849, p. 463, Pl. 15 (*G. mauritanica*, *G. obesa*, *G. vorax*).

Milne-Edwards: Hist. Nat. des Crust., vol. 3, 1840 (*G.* (*A.*) *rapax*).

— Atlas du Règne animal de Cuvier, Crust., 1849(?) (*G.* (*A.*) *rapax*).

Montagu, G.: Descript. of several marine animals found on the south coast of Devonshire; Transact. Linn. Soc. London, Zool., vol. 9, 1808, p. 81—114, 7 Pl. (*G. maxillaris*).

Norman, A. & Scott, Th.: The Crust. of Devon and Cornwall, London 1906 (*G. maxillaris*, *G. oxyuræa*).

Ohlin, A.: Arctic Crust. collected during the Swedish Arctic Exped. 1898—99, 1, Leptost., Isop., Cumac.; Bihang Kgl. Svenska Vet. Akad., vol. 26, ser. 4, No. 12, 1901 (*G. elongata* Kr., *Bathygn. stygia* G. O. Sars).

Otto: Nova Acta physico-med. Acad. Cæsareo-Leopold. nat. Curios., vol. 14, 1828, p. 348, Pl. 22 fig. 1—2 (*Praniza branchialis*).

Richardson, H.: Monograph Isop. N.-America; Bull. U. S. Nat. Mus., No. 54, 1905, p. 56 (*G. cristata* H. J. H., *G. elongata* Kr., *G. cerina* Stimpson).

— Isop.; Charcot: Exped. Antarct. Française 1903—05 (1907?), p. 3 (*G. antarctica* Studer = *G. polaris* Hodgson).

— Some new Gnathiidæ from the Atlantic coast of N.-America; Proc. U. S. Nat. Mus., vol. 35, 1908, p. 483 (*G. multispinis*, *G. serrata*, *Bathygn. curvirostris*).

— Isop. .... N. W. Pacific; Proc. U. S. Nat. Mus., vol. 37, 1909, p. 75. (*G. tuberculata*).

— Crust. Isop. du Travailleur et du Talisman; Bull. Mus. d'Hist. Nat. Paris, 1911, No. 7 (*G. cæca*, *G. frontalis*).

Risso, A.: Hist. Nat. des Crust. des environs de Nice, 1816 (*G. forficularis*).

— Hist. Nat. de l'Europ. Méridionale, 1826, p. 82—83, Pl. 5, fig. 2 (*Praniza mesasoma*, *P. plumosa*, *P. ventricosa;? Zuphea sparicola*).

Sars, G. O.: Undersøg. over Christianiafjordens Dybvandsfauna, 1869 (*G. oxyuræa* Lilljeb. p. 49),

— Undersøg. over Hardangerfjordens Fauna; Christiania Vid. Selsk. Forh., 1871, p. 32 (*G. dentata*, *G. abyssorum*).

— Prodromus descript. Crust.; Archiv f. Math. og Naturvid., Christiania, vol. 2, 1877 (*G.* (*Cœcogn.*) *stygia*, *G. hirsuta*).

— Crust. et Pycnog. nova; Archiv f. Math. og Naturvid., Christiania, vol. 4, 1879 (*G. robusta*).

— Norske Nordhavs-Exp., Crust. pt. 1, 1885, p. 85—95, Pl. 8 (*G.* (*Cœcogn.*) *stygia*, *G. hirsuta*, *G. robusta*).

— Account of the Crust. of Norway, vol. 2, 1899 Isop., p. 50, Pl. 21—23 (*G. maxillaris* Mont. (non M.-Edw.), *G. dentata*, *G. elongata*, *G. abyssorum*).

Schoenichen, W.: *Gnathia aldabrensis* n. sp.; Reise in Ostafrika von A. Voeltzkow, vol. 2, Stuttgart 1908, p. 193—98.

Smith, Geof.: Metamorphosis and Life-hist. of *Gnathia maxillaris;* Mitt. Zool. Stat. Neapel, vol. 16, 1904, p. 469—79, Pl. 18.

Stebbing: A History of Recent Crust.; Internat. Sci. Ser., vol. 74, 1893, p. 335.
— Crust. brought by Dr. Willey from the South Seas; Willey's Zoological Research, pt. 5, 1901 (*G. aureola*).
— Isopoda .... Ceylon; Report Ceylon pearl oyster fisheries, vol. 4, 1905, p. 9 (*G. insolita*).
— Isop. Porcupine-Exped.; Transact. Zool. Soc. London, vol. 20, pt. 4, 1913, p. 432 (Abstract in Proc. Zool. Soc. London 1912, p. 42) (*G. cristatipes*, *G. schistifrons*, *Praniza* sp.).
Stimpson: Marine Invert. Grand-Manan; Smithson. Contrib. to Knowledge, vol. 6, 1853, p. 42 (*Praniza cerina* = *Anceus americanus*).
Studer: Isop. .... »Gazelle«; Anhang Abhandl. Akad. Wiss. Berlin, 1883 (1884) (*G. antarctica*).
Tattersall: Isop.; Nord. Plankton, Lief. 14, 1911, vol. 6, p. 192 (*G. maxillaris* Mont., *G. oxyuræa* Lilljeb.).
Wagner, Nic.: Observat. sur l'Organisation et le developpement des Ancées; Bull. Acad. Imp. St. Pétersbourg, vol. 10, 1866, p. 497—502.
Walter, A.: *Anceus* (*Praniza*) *Torpedinis* n. sp. aus Ceylon, Jena Zeitschr. f. Naturgesch., vol. 18, Heft. 3, 1885, p. 445—51, Pl. 15.
Westwood, J. O.: Extrait de recherches sur les Crust. du genre Praniza de Leach; Ann. Sci. Nat., Zool., vol. 27, 1832, p. 316—32, Pl. 6 (*P. maculata* Westw., *P. marina* Slabber, *P. coeruleata* Mont., *P. Montagui* Westw., *P. branchialis* Otto, *P. fuscata* Johnst.).

List of the genera and species.

(Key to the genera Dollfus 1901, p. 243).

1. gen. **Cæcognathia** Dollfus 1901, p. 244.

1. *C.* (*Anceus*) *stygia* G. O. Sars 1877, No. 65, p. 348. — G. O. Sars 1885, p. 85, Pl. 8, fig. 1—22. — Dollfus 1901, p. 244. — Ohlin 1901, p. 22, fig. 3.
2. *C. Sarsii* Dollfus 1901, p. 244, fig. 3.

2. gen. **Euneognathia** Stebbing 1893, p. 338.

Euneog., Dollfus 1901, p. 240.

1. *E.* (*Anceus*) *gigas* Beddard, Proc. Zool. Soc. 1886, pt. 1, p. 120. — Beddard, Challenger Report 1886, p. 137, Pl. 18, fig. 8—10. — Hodgson 1910, p. 15 (*ubi lit.*). Pl. 1 fig. 3.

3. gen. **Bathygnathia** Dollfus 1901, p. 240.

1. *B.* (*Anceus*) *bathybia* Beddard, Proc. Zool. Soc. 1886, pt. 1, p. 119. — Beddard, Challenger Report 1886, p. 135, Pl. 18 fig. 1—7.
2. *B. curvirostris* Richardson 1908, p. 483, fig. 1—3.

4. gen. **Akidognathia** Stebbing 1912, p. 42.

Akidogn. Stebbing 1912, p. 42. — Stebbing 1913, p. 235.

1. *A. ædipus* Stebbing 1912, p. 42. — Stebbing 1913, p. 235, Pl. 25.

5. gen. **Gnathia** Leach.

(Literature see Stebbing 1913, p. 232).

The species are enumerated in alphabetical order.

1. *G.* (*A.*) *abyssorum* G. O. Sars 1871, p. 34. — G. O. Sars 1899, p. 56, Pl. 23 fig. 2.
2. *G. aldabrensis* Schoenichen 1908, p. 193—98, with figs. (a *Praniza*)
   [*G.* (*A.*) *americana* Stimpson 1853, p. 42 = *A. cerina* Stimpson].
3. *G.* (*A.*) *antarctica* Studer 1883 (1884) p. 4. — Richardson 1907, p. 3. — Hodgson 1910, p. 11 (*ubi lit.*), Pl. 1, fig. 2. — *G. polaris* Hodgson 1902, p. 241—43, Pl. 32.
4. *G.* (*A.*) *ascifera* Hesse 1864, p. 48, Pl. 2, fig. 2, Pl. 3 fig. 12.
5. *G. aureola* Stebbing 1901, p. 627, Pl. 66, fig. A, Pl. 74, fig. E.
6. *G.* (*A.*) *balani* Hesse 1874, p. 8, Pl. 21 fig. 1—19.
7. *G.* (*A.*) *branchialis* Otto 1828, p. 328, Pl. 22 fig. 1—2. — Westwood 1832, p. 327.
8. *G.* (*A.*) *brivatensis* Hesse 1864, p. 42, Pl. 1 fig. 22—25, Pl. 2 fig. 17, 18, 32, 33, Pl. 3 fig. 8—11.
9. *G. cæca* Richardson 1911, p. 519.
10. *G.* (*P.*) *cerina* (+ *A. americanus*) Stimpson 1853, p. 42, Pl. 3 fig. 31. — Richardson 1905, p. 59 (*ubi lit. et syn.*), fig. 43—46.
11. *G.* (*A.*) *cotti bubali* Hesse 1874, p. 16, Pl. 22 fig. 1—5.
12. *G.* (*A.*) *congeri* Hesse 1875, p. 445, Pl. 1.
13. *G. cristata* H. J. Hansen 1887 (1888), p. 182, Pl. 7 fig. 2. — H. Richardson 1905, p. 56 fig. 41.
14. *G. cristatipes* Stebbing 1912, p. 42. — Stebbing 1913, p. 232, Pl. 24 fig. A.
15. *G.* (*A.*) *Danielii* Hesse 1884, p. 1—11, Pl. 18.
16. *G.* (*A.*) *dentata* G. O. Sars 1871, p. 32. — G. O. Sars 1899, p. 54, Pl. 22 fig. 2.
    [*G.* (*P.*) *Edwardsii* Bate = *G. oxyuræa* Lilljeborg].
17. *G.* (*A.*) *elongata* Krøyer 1847, p. 388. — Krøyer 1846 (1849?), Pl. 30 fig. 3. — G. O. Sars 1899, p. 55, Pl. 23 fig. 1. — H. Richardson 1905, p. 58 (*ubi lit. et syn.*), fig. 42.
18. *G.* (*A.*) *erythrina* Hesse 1864, p. 50, Pl. 2 fig. 3, Pl. 3 fig. 13.
19. *G.* (*A.*) *falcaria* Hesse 1864, p. 52, Pl. 1 fig. 19, Pl. 2 fig. 4, Pl. 3 fig. 14.
20. *G.* (*A.*) *ferox* Haswell 1884, p. 1005, Pl. 52 fig. 1—5.
21. *G.* (*A.*) *forficularis* Risso 1816, p. 52, Pl. 2 fig. 10.
22. *G.* (*A.*) *formica* Hesse 1864, p. 39, Pl. 1 fig. 28, Pl. 2 fig. 15, Pl. 3 fig. 5—7.
23. *G. frontalis* Richardson 1911, p. 520.
    G. furcata Sp. Bate (*ubi*?; *teste* Brian 1911).
24. *G.* (*P.*) *fuscata* Johnston 1832, vol. 5, p. 520, fig. p. 521. — Westwood 1832, Pl. 6 fig. 26. — Bate & Westwood 1868, p. 197.
25. *G. Grimaldii* Dollfus 1901, p. 240 fig. 1.
26. *G. Halidaii* Bate & Westwood 1868, p. 203, fig. — Fixation of *G. H.*, Boutan, Comptes Rendus Paris, vol. 153, 1911, p. 639—41.

27. *G.* (*A.*) *hirsuta* G. O. Sars 1877, No. 66. — G. O. Sars 1885, p. 92, Pl. 8 fig. 23—24.
28. *G. insolita* Stebbing 1905, p. 9, Pl. 12 fig. B.
29. *G.* (*A.*) *latidens* Beddard, Proc. Zool. Soc. London 1886, p. 120. — Beddard, Challenger Report 1886, p. 141, Pl. 18 fig. 11.
30. *G.* (*A.*) *lupi* Hesse 1864, p. 59, Pl. 4 fig. 5—6.
31. *G.* (*P.*) *maculata* Westwood 1832, p. 326, Pl. 6 fig. 4—25. — Bate & Westwood 1868, p. 199.
    G. (*A.*) *manticora* Hesse 1864, p. 53, Pl. 3 fig. 15—16, Pl. 4 fig. 2—4 (= ? *G. maxillaris* Mont.)
32. *G.* (*Oniscus*) *marina* Slabber; Westwood 1832, p. 326, Pl. 6 fig. 1—2.
33. *G.* (*A.*) *mauritanica* Lucas, Algérie 1849, p. 87, No. 150 *bis*. — Lucas, Nord d'Afrique 1849, p. 463, Pl. 15 fig. 2.
34. *G.* (*Cancer*) *maxillaris* Montagu. (*non* G. O. Sars 1899). — Latreille, Encyclopédie méthodique 1817, Pl. 336, fig. 25. — Bate & Westwood 1868, p. 187 (*ubi lit. et syn.*). — G. Smith 1903. — Norman & Scott 1906, p. 36, Pl. 2 fig. 1—8. —? *G manticora* Hesse 1864.
    [*G. maxillaris* G. O. Sars = *G. oxyuræa* Lilljeb.].
35. *G.* (*P.*) *mesasoma* Risso 1826, p. 83.
36. *G.* (*P.*) *Montagui* Westwood 1832, p. 327.
37. *G. multispinis* Richardson 1908, p. 485, fig. 4—5.
38. *G.* (*P.*) *obesa* Lucas, Algérie 1849, p. 88, No. 150 *ter*. — Lucas, Nord de l'Afrique 1849, p. 463, Pl. 15 fig. 3.
39. *G.* (*A.*) *oxyuræa* Lilljeborg 1852 (1855), p. 133. — Norman & Scott 1906, p. 37, Pl. 2 fig. 9—10, Pl. 3 fig. 1—5. — Tattersall 1911, p. 197, fig. 18—30. — *G. maxillaris* G. O. Sars 1899, p. 52, Pl. 21, 22 fig. 1. — *G. max.* Brian 1911. — *A. Edwardsii* Bate 1858, p. 165, Pl. 6 fig. 1—2. — *A. Edw.* Bate & Westwood 1868, p. 201, fig. — *Praniza coeruleata* Lilljeborg 1852 (1855), p. 132.
40. *G.* (*A.*) *platyrhynchus* Hesse 1874, p. 23, Pl. 22 fig. 12—15.
41. *G.* (*A.*) *plumosa* Risso 1826, p. 82.
    [*G. polaris* Hodgson = *G. antarctica* Studer].
42. *G. propinqua* Bonnier 1896, p. 571, Pl. 31 fig. 4.
43. *G.* (*A.*) *rapax* Milne-Edwards 1840, p. 196, Pl. 33 fig. 12. — Milne-Edwards 1849, p. 182, Pl. 62 fig. 3.
44. *G.* (*A.*) *rapax* Hesse 1864, p. 61, Pl. 4 fig. 7—9.
45. *G. Richardi* Dollfus 1901, p. 242, fig. 2.
46. *G.* (*A.*) *rhinobatis* Kossmann 1880, p. 105—07, Pl. 8 fig. 1—6 (a *Praniza*).
47. *G.* (*A.*) *robusta* G. O. Sars 1879, No. 6, p. 432. — G. O. Sars 1885, p. 94, Pl. 8 fig. 25—27. — Dollfus 1901, p. 243.
48. *G.* (*A.*) *scarites* Hesse 1864, p. 57, Pl. 3 fig. 15—16.
49. *G. schistifrons* Stebbing 1912, p. 42. — Stebbing 1913, p. 233. Pl. 24 fig. B.
50. *G.* (*A.*) *scombri* Hesse 1874, p. 25, Pl. 22 fig. 22—24 (a *Praniza*).
51. *G. serrata* Richardson 1908, p. 487, fig. 6—7.
    ? *G.* (*Zuphea*) *sparicola* Risso 1826, p. 104 (a *Praniza*?).
    [*G.* (*A.*) *stygia* G. O. Sars = *Cœcognathia s.*].
52. *G.* (*A.*) *surmuleti* Hesse 1864, p. 64. — Hesse 1874, p. 19, Pl. 22 fig. 6—11.
53. *G.* (*A., P.*) *torpedinis* Walter 1885, p. 445 (a *Praniza*).
54. *G.* (*A.*) *triglæ* (*trigli*) Hesse 1864, p. 56, Pl. 4 fig. 12.
55. *G. tuberculata* Richardson 1909, p. 75 fig. 1—3.
56. *G.* (*A.*) *tuberculosus* Beddard, Proc. Zool. Soc. London 1886, pt. 1, p. 120. — Beddard, Challenger-Report 1886, p. 139, Pl. 10 fig. 8—12, Pl. 18 fig. 12.
57. *G.* (*A.*) *uncifera* Hesse 1874, p. 20, Pl. 22 fig. 16—21.
58. *G.* (*A.*) *ventricosa* Risso 1826, p. 82, Pl. 5 fig. 2.
59. *G.* (*A.*) *verrucosa* Hesse 1864, p. 63, Pl. 4 fig. 1, 10.
60. *G.* (*A.*) *vorax* Lucas, Nord de l'Afrique 1849, p. 85, Pl. 15 fig. 1 (no descript.). — Heller 1866, p. 749.
    Praniza sp. Dollfus 1901, p. 243.
    — Stebbing 1913, p. 234.
    Reinhardi Krøyer 1838, p. 301 (78), Pl. 4 fig. 20 (a *Praniza*).

GNATHIA THORI n. sp. (Fig. 1—2).

St. 140. 20-7-1910. *37°29′ N., 12°34′ E.* 112 m. clay. 1 spec., ♂.

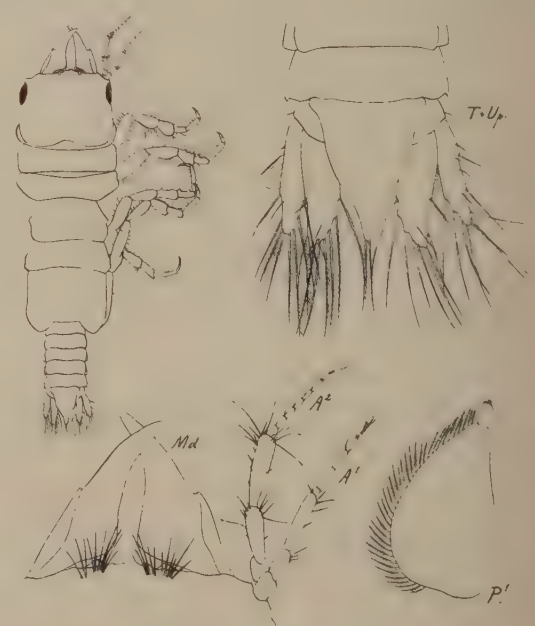

Fig. 1. Gnathia Thori.

Despite a careful study of all descriptions and illustrations of the species from the north Atlantic and the Mediterranean, I have not been able to ascribe the specimen from the "Thor" to any hitherto determined

species. It is characteristic, by the way, that practically speaking, none of the more recent writers have been able to identify their species with those described by earlier authors; most of the older species have, moreover, at least as far as I have been able to judge from the works on the subject, only been found once, and never subsequently recognised, which also seems to suggest that the descriptions are bad. Only by actual examination of the original specimens from which the old species were named would it seem possible to reduce this difficult genus to order, refer synonyms to their proper species, etc.

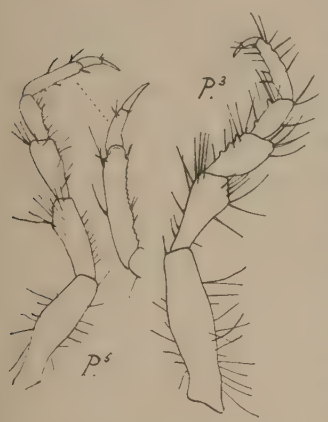

Fig. 2. Gnathia Thori. P. 3. P. 5.

There being but one specimen from the "Thor", I can only give figures and descriptions of such features as could be observed without having recourse to dissection.

Length, 5,5 mm.

On the whole, the species very much resembles *G. maxillaris*, G. O. Sars, (1899, Pl. 21). differing, however, by a number of good characteristic features.

The whole surface is smooth, without areolations etc., Cephalosome and oral parts highly calcified, with a consistency resembling that of the Cumacea. Cephalosome almost square, length nearly equal to breadth. Eyes usual size. Frontal edge turned slightly downward, teeth somewhat small, the middle tooth especially so. The two pairs of antennæ are of the usual shape; Ant. 1 with 5 joints in the flagellum, of which Nos. 1 and 5 much shorter than the others; Ant. 2 has 7 joints of almost equal length.

The shape of the mandibles is very characteristic; they are fairly narrow, with no dentition on the inner edge: in the broad proximal part, the outer edge is turned upward, a feature which, as far as I have been able to ascertain, does not occur in any other species. With regard to p. 1 (Gnathopoda) there is nothing particular to be said. The remaining pereiopoda are of approximately equal length. The small, but strong teeth shown by Sars (1899, Pl. 23) on the inner side of 3rd and 4th joints of p. 2 in *G. elongata* are found in the same shape and number in *G. Thori* on p. 3—5; on p. 2 and p. 6 these teeth are lacking. The sixth segment of the body is almost as long as 4 and 5 together; the seventh is not visible from the dorsal side. The metasome is of the usual shape. The proximal half of the telson is shaped almost identically with that of *G. maxillaris* G. O. Sars (1899, Pl. 21) but it is much narrower towards the point, ending in two long setæ, but having no setæ on the dorsal side. Of the uropoda, the exopodite is of approximately the same length as the telson, the endopodite being somewhat longer. The shape and arrangement of setæ may be seen in the figures.

Remarks. This species, which I have named after the ship of the expedition, is very easily distinguishable from the other species by its mandibles, frontal edge and telson.

Fam. ÆGIDÆ.

Genus ÆGA.

ÆGA INCISA Schiødte & Meinert

Æga incisa Schiødte & Meinert, Monogr. Cymothoarum; Naturh. Tidsskrift, ser. 3, vol. 12, 1879, p. 373, Pl. 4 fig. 13—15.

* — — H. Richardson, Isop. N. America; Bull. Mus. U. S. Nat. Mus., vol. 54, 1905, p. 180, fig. 162—64 (*ubi lit.*).

St. 132. *38°57′ N, 9°47′ E.* 14-7-1910. 1227 m. 3^{05} am.
St. 133. *38°18′ N, 9°59′ E.* 14-7-1910. 600 m. 9^{20} pm. 600 m. w. 1 spec.

Also found: Mediterranean (Schiödte & Meinert); Capri (Lo Bianco, Mitt. Zool. Stat. Neapel, vol. 16, 1903, p. 257); Fernandina (Florida); Georgia; St. Augustine (Florida); *31°57′ N, 78°18′35″ W.* (Richardson l. c.).

Genus ROCINELA.

ROCINELA DANMONIENSIS Leach

Rocinela danmoniensis Leach, Dict. Sci. Nat., vol. 12, p. 349 (*teste* G. O. Sars).

Æga rotundicauda Lilljeborg, Norges Crust.; Öfvers. Kgl. Svenska Vet. Akad. Förh., 1851, p. 23.

nasuta Norman, in Wyville Thomson: Depths of the Sea, 1873, p. 127, woodcut.

**Rocinela danmoniensis* G. O. Sars, Account vol. 2, 1899, p. 65, Pl. 27.

* — — Norman, British Isop.; Ann. Mag. Nat. Hist., ser. 7, vol. 14, 1904, p. 436 (*ubi lit. et syn.*).

* — — Norman & Scott, Crust. of Devon and Cornwall 1906, p. 38, Pl. 3, fig. 6—8.

St. 1. *49°17′ N, 4°13′ W.* 28-11-1908. 25 m. w. 3 spec.
St. 41. *43°23′ N, 2°01′ W.* 14-6-1906. 60 m. w. 3 spec.
St. 195. *48°20′ N, 5°42′ W.* 13-9-1906. 170 m. 65 m. w. 1 spec.

There is no doubt of the fact that all the specimens really belong to this species, which is very apt to be confused with the closely related *R. Dumerilii* Lucas (see Norman & Scott l. c. p. 39, Pl. 3, fig. 10),

Also found: Mediterranean (Carus). Plymouth, Polperro (Norman & Scott). *60°39′ N, 3°9′ W*, 203 fath., and *60°45′ N, 3°6′ W*, 250 fath. (W. of Shetland; Norman l. c. 1904). Kattegat (H. J. Hansen, Danmarks Isop. .... etc. 1909). Færoes (Schiödte & Meinert, Cymoth.). The whole of Norway, or at least S. of Trondhjem (Sars, Account; Norman l. c. 1904).

Genus SYSCENUS.

SYSCENUS INFELIX Harger (Fig. 3).

Syscenus infelix Harger, Report U. S. Comm. Fish and Fisheries for 1878, pt. 6, 1880, p. 387.
— — Harger, Bull. Mus. Comp. Zool. Harvard Coll., vol. 9, 1883, No. 4, p. 100, Pl. 3, fig. 5, Pl. 4, fig. 3.
Harponyx pranizoides G. O. Sars, Oversigt af Norges Crust.; Forh. Vid. Selsk. Christiania 1882, No. 18, p. 60, Pl. 2, fig. 1.

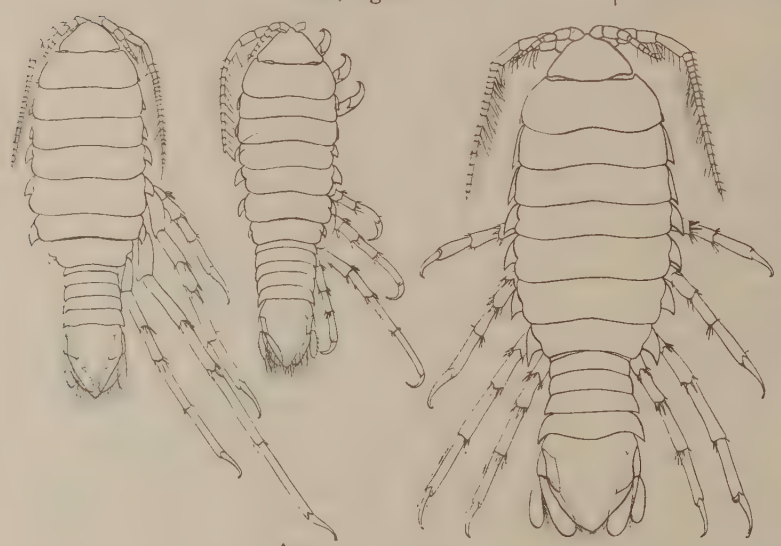

Fig. 3. Syscenus infelix.
St. 14 : 8 mm. — St. 99 : 6 mm. — St. 220 : 10 mm.

Rocinela Lilljeborgii Bovallius, A new Isop. from the coast of Sweden; Bihang Kgl. Svenska Vet. Akad. Handl., vol. 10, No. 10, 1885, p. 3, Pl. 1—2.
**Syscenus infelix* G. O. Sars, Account vol. 2, 1899, p. 67, 247, Pl. 28, Suppl. Pl. 1.
Syscenus infelix Lo Bianco, Mitt. Zool. Stat. Neapel vol. 16, 1903, p. 257, Pl. 7, fig. 10 (color. fig.).
* — — H. Richardson, Monogr. Isop. N. Am. 1905, p. 212 (*ubi lit.*), fig. 216.

St. 14. *41°24′ N, 17°15′ E.* 1125 m. 21-12-1908. 1000 m. w. 8^{20} am. 1 spec., 8 mm.
St. 220. *36°25′ N, 0°42′ E.* 375 m. 4-9-1910. 25 m. w. 2^{15} am. 1 spec., 10 mm.
St. 108. *36°03′ N, 0°27′ W.* 2435 m. 25-6-1910. 300 m. w. 10^{30} pm. 2 spec., 8—9 mm.
St. 99. *36°02′ N, 5°16′ W.* 750 m. 23-6-1910. 300 m. w. 11^{25} pm. 1 spec. 7 mm.
St. 99. *36°02′ N, 5°16′ W.* 750 m. 23-6-1910. 65 m w. 0^{10} am. 1 spec., 6 mm.
St. 204. *38°52′ N, 7°43′ E.* > 1000 m. 27-8-1910. 945 m. w. 5^{45} am. 1 spec., 8 mm.

The specimens taken on board the "Thor" are of considerable interest as showing the transition from the youngest known stage (G. O. Sars' *Harponyx pranizoides*) to the adult. The smallest specimen from the "Thor" however, (St. 99, 65 m. w.) though of the same size (6 mm) as the young form described by Sars, has already 7 pairs of legs highly developed. In the specimen from St. 14, which, judging by its size (8 mm.) and by the greater number of joints in the antennæ, must be somewhat older, the 3 posterior pairs of pereiopoda especially are considerably longer. In the older individuals, the cephalon is relatively far smaller than in the younger. The telson becomes shorter and broader with increasing age; this feature is, however, subject to considerable variation. It will be noticed, for instance, that in the specimen from the "Thor" taken at St. 220 (10 mm, Fig. 3) the telson has almost the same shape as that shown in Sars' illustration of the adult (Account, Suppl. Pl. 1) whereas the specimen described by Bovallius, which is more than twice as large (32 mm.) has a far longer, and thus more "youthful" telson. The largest specimen from the "Thor" has contracted in the spirit to such a degree that 1. abdominal segment is almost entirely hidden.

Also found: East N. America. N. of Delaware Bay (Richardson), *50°90′ N, 7°21′ W*, 516 fathoms (N. of Hebrides: Norman 1904) Hvitingsø and Bekkervig (W. Norway) 80—150 fathoms. (Sars, Account) Bohuslän, on operculum of a whiting (Bovallius) Skagerak and Kattegat, 23—112 fathoms (H. J. Hansen, Danmarks Isop. .... 1909 (1910) p. 203). Capri, (Lo Bianco, Mitt. Zool. Stat. Neapel, vol. 15, 1903) *35°06′05″ N, 138°40′20″ E.*, 211—293 fathoms, fine black sand, (Richardson; Proc.

U. S. Nat. Mus. Vol. 37, 1910, p. 85). As the record of distribution shows, the species has never hitherto been found in the neighbourhood of the localities where it was taken by the "Thor". All the specimens from the "Thor" were found in a free state, not attached to any other animal serving as host.

Genus CIROLANA.

CIROLANA BOREALIS Lilljb.

Cirolana borealis Lilljeborg, Norges Crust.; Öfvers. Kgl. Svenska Vet. Akad. Handl., 1851, p. 23.

— *spinipes* Bate & Westwood, British sessile-eyed Crust., vol. 2, 1867, p. 299.

* — *borealis* H. J. Hansen, Cirolanidæ; Kgl. Danske Vid. Selsk. Skr., math. naturvid. Afd., vol. 3, 1890, p. 321, Pl. 1, fig. 1.

* — — G. O. Sars, Account vol. 2, 1899, p. 70, Pl. 29.

— — Norman, British Isop.; Ann. Mag. Nat. Hist., ser. 7, vol. 14, 1904, p. 437.

— — Richardson, Monogr. Isop. N.-Am. 1905, p. 101 (*ubi lit. et syn.*).

St. 104. *54°16′ N, 6°06′ E.* 2-7-1905. 41 m. 1 spec.

Distribution. The works of H. J. Hansen, Norman, Richardson and Sars quoted above record a great number of finds from the eastern part of N. America, and the western coast of Europe from Norway to the Adriatic.

CIROLANA CRANCHII Leach

Cirolana Cranchii Leach, Cymothoadées; Dict. des Sci. Nat., vol. 12, Paris 1818, p. 347.

Nelocira Swainsonii Leach, *ibid.*, p. 347.

— — Desmarest, Considérations générales sur la classe des Crust.; Isop., Paris 1825, p. 302, Pl. 48, fig. 2.

Cirolana Cranchii Desmarest, *ibid.*, p. 302.

* — — H. J. Hansen, Cirolanidæ; Kgl. Danske Vid. Selsk. Skr., 6. Række, naturvid. mat. Afd., vol. 3, 1890, p. 341, Pl. 3, fig. 3 (*ubi lit et syn.*)

Cadiz' Roads, 6 m., among algæ. 24-2-1909, Dredge. 1 spec.

Also found: From the English Channel to Sardinia and Senegambia (H. J. Hansen l. c.; Norman, Ann. Mag. Nat. Hist., ser. 7, vol. 14, 1904, p. 438).

Genus EYRYDICE.

EURYDICE SPINIGERA H. J. Hansen

Eurydice spinigera H. J. Hansen, Cirolanidæ; Kgl. Danske Vid. Selsk. Skr., 6. Række, math.-naturvid. Afd., vol. 3, 1890, p. 367, Pl. 5, fig. 4, Pl. 6, fig. 1.

Eyrydice spinigera Norman, British Isop.; Ann. Mag. Nat. Hist., ser. 7, vol. 14, 1904, p. 440.

— — H. J. Hansen, Revision .... Cirolaninæ; Journ. Linn. Soc., London, Zool., vol. 29, 1905, p. 359.

— — H. Richardson, Monogr. Isop. N.-Am. 1905, p. 125, fig. 109.

* — — Tattersall, Nord. Plankton, vol. 6 (Lief. 14) 1911, p. 205 (*ubi lit.*). fig. 37—41.

St. 104. *54°16′ N, 6°06′ E.* 41 m. 2-7-1905. 1 spec.

Also found: South and west coasts of British Isles, Channel Islands, and eastern part of Atlantic. (Tattersall 1911). Atlantic between Denmark and Danish West Indies (H. J. Hansen l. c. 1905). — Is generally found at the surface of the water, but has occasionally been taken at the bottom (Tattersall 1911).

EURYDICE TRUNCATA Norman

Cirolana truncata Norman, Ann. Mag. Nat. Hist., ser. 4, vol. 2, 1868, p. 421, Pl. 23, fig. 12—15.

Eurydice — H. J. Hansen, Isop., Cumac. u. Stomat. d. Plankton-Exp., 1895, p. 13, Pl. 1, fig. 5.

— — Tattersall, Isop.; Fisheries, Ireland, Sci. Invest. 1904, pt. 2 (1905), p. 45, Pl. 11, fig. 5—8.

* — — Tattersall, Isop.; Nord. Plankton, vol. 6 (Lief. 14), 1911, p. 214 (*ubi lit.*) fig. 72—79.

St. 34. *43°27′ N, 8°16′ E.* 23-1-1909. 200 m. w. 6^{35} am. 1 spec.

St. 35. *43°36′ N, 7°36′ E.* 29-1-1909. 2000 m. 25 m. w. 9^{10} pm. 1 spec.

St. 62. *35°45′ N, 5°59′ W.* 22-2-1909. 25 m. w. 9^{10} pm 1 spec.

St. 62. *35°45′ N, 5°59′ W.* 22-2-1909. 100 m. w. 8^{25} pm. 5 spec.

St. 135. *37°17′ N, 10°28′ E.* 16-7-1910. 200 m. 25 m. w. 0^{55} am. 2 spec.

St. 140. *37°29′ N, 12°34′ E.* 20-7-1910. 112 m. Dredge. 1 spec.

St. 148. *30°45′ N, 19°02′ E.* 26-7-1910. 290 m. Dredge. 1 spec.

St. 179. *40°02′ N, 25°55′ E.* 13-8-1910. 85 m. 65 m. w. 2^{15} am. 1 spec.

St. 182. *38°13′ N, 24°48′ E.* 13-8-1910. 480 m. 65 m. w. 10^{30} am. 1 spec.

St. 207. *39°58′ N, 3°41′ E.* 28-8-1910. 64 m. 25 m. w. 8^{40} pm. 1 spec.

Also found: Capri, and between Capo Corso and Monaco (Lo Bianco, Mitl. Zool. Stat. Neapel, vol. 15, 1903) Shetland, W. Scotland, W. Ireland, S. England, Atlantic coast of France, Morocco, Mediterranean. "Probably always pelagic, but not found over greater depths than 100 fathoms (= 183 m.)" (Tattersall, l. c. 1911). As is evident from the foregoing,

Tattersall's statement as to the occurrence of this species is incorrect, since it has been taken by the "Thor" over depths of 290, 480, and even over 2000 m.

EYRYDICE GRIMALDII Dollfus.

Eurydice Grimaldii Dollfus, 3ième campagne de l'Hirondelle 1887; Bull. Soc. Zool. de France 1888, p. 6, fig.

— *elegantula* H. J. Hansen, Cirolanidæ; Kgl. Danske Vid. Selsk. Skr., math. naturvid. Afd., 6. Række, vol. 5, 1890, p. 364, Pl. 5, fig. 2.

— *Grimaldii* Norman, Brit. Isop.; Ann. Mag. Nat. Hist. ser. 7, vol. 14, 1904, p. 439.

— — Tattersall, Isop.; Fisheries, Ireland, Sci. Invest., 1904, pt. 2 (1905), p. 63.

— — H. J. Hansen, Revision .... Cirolaninæ; Journ. Linn. Soc., London, Zool. vol. 29, 1905, p. 361.

* — — Tattersall, Isop.; Nord. Plankton, vol. 6 (Lief. 14) 1911, p. 212, fig. 65—71.

St. 82. *51°00′ N, 11°43′ W.* 1020—1370 m. 800 m. w. 15-6-1905. 1 spec.

(No number) *51°40′ N, 6° W.* Surface. 29-8-1905. 1 spec.

St. 398. ("Ingolf" 1) *36°48′ N, 14°22′ W.* 2600 m. 26-10-1911. 12^{40}—1^{10} am. 10 spec.

Also found: Eastern Atlantic, near Azores, Spain, SW. and W. Ireland, SW. Iceland, between Iceland and Scotland, near the Færoes. It is more oceanic than most other species of the genus, and is found both at the surface and at depths of 500 fath. (= 914 m.) (Tattersall, 1911).

Fam. CYMOTHOIDÆ.

St. 61. 740 m. *35°57′ N, 5°35′ W.* 21-2-1909. 3^{25} pm. 60 m. w. 1 spec., 6,5 mm.

St. 99. 750 m. *36°02′ N, 5°16′ W.* 23-6-1909. 11^{25} pm. 300 m. w. 1 spec., 5 mm.

These two specimens, which are both young stages, I have been unable to classify.

Fam. SPHÆROMIDÆ.

(Literature *vide* Stebbing, Journ. Linn. Soc. Zool., vol. 31, 1910, p. 222).

Genus CYMODOCEA.

CYMODOCEA TRUNCATA Leach

Cymodocea truncata (Mont.) Leach; Bate & Westwood, Brit. sessile-eyed Crust., vol. 2, 1868, p. 426 (♂).

— *emarginata* Leach; Bate & Westwood, *ibid.* p. 428 (♂).

Sphæroma curtum Leach; Bate & Westwood, *ibid.* p. 412 (♀).

— *Prideauxianum* Leach; Bate & Westwood, *ibid*, p. 415 (♀).

**Cymodoce truncata* Tattersall, Isop.; Fisheries, Ireland, Sci. Invest. 1904, pt. 2 (1905), p. 6, Pl. 2.

* — Norman & Scott, Crustacea of Devon and Cornwall 1906, p. 44 (*ubi syn.*), Pl. 4, fig. 3—14.

Sphæroma inerme Tattersall, Report British Assoc. 1904 (1905), p. 601.

St. 44. *38°31′ N, 8°57′ E.* 8—25 m. 4-2-1909. 2 spec.
St. 105. *36°43′ N, 2°08′ W.* 20 m. 24-6-1910. 1 spec.
St. 149. *30°30′ N, 19°02′ E.* 75—80 m. 26-7-1910. 1 spec.

Also found: Round British Isles, Mediterranean (Tattersall, l. c. 1911) "Nordeuropäische Meere" (Thielemann; Isop. Ostasiens, Abh. d. 2 Kl. d. Akad. d. Wiss. 2 Suppl.-bd. 3 Abth. München, 1912, p. 100). The Zoological Museum at Copenhagen possesses specimens from the British Isles, France, and the Mediterranean.

2. Valvifera.

Fam. IDOTEIDÆ.

Genus IDOTEA.

IDOTEA METALLICA Bosc (Fig. 4).

Idotea metallica Bosc, Hist. Nat. des Crust., vol. 2, 1802, p. 179, Pl. 15, fig. 6.

— *robusta* Krøyer, Naturhist. Tidsskrift, Ny Række, vol. 2, 1846, p. 108.

— Krøyer, in Gaimard, Voyage en Scand., 1846 (1849?), Pl. 26, fig. 3.

— Harger, Report U. S. Comm. Fish and Fisheries, pt. 6, 1880, p. 349, Pl. 6, fig. 30—32.

* — *metallica* Miers, Revis. of Idot.; Journ. Linn. Soc. Zool., vol. 16, 1883, p. 35 (*ubi lit. et syn.*).

— — Dollfus, Les Idot. des côtes de France; Feuille des jeunes Naturalistes, vol. 24, 1895, p. 8, fig. 24.

— — Richardson, Monogr. Isop. N.-America 1905, p. 362 (*ubi lit. et syn.*).

— — Tattersall, Isop.; Nord. Plankton, vol. 6 (Lief 14), 1911, p. 227 (*ubi lit. et syn.*), fig. 116.

St. 116. *39°27′ N, 5°26′ E.* 2860 m. 30-6-1910. 300 m. w. 30 min. 1^{40} am. 1 spec., 8 mm.

St. 171. *41°07′ N. 29°05′ E.* 60 m. 10-8-1910. 50 m. w. 15 min. 3^{30} pm. 3 spec., 3 mm.

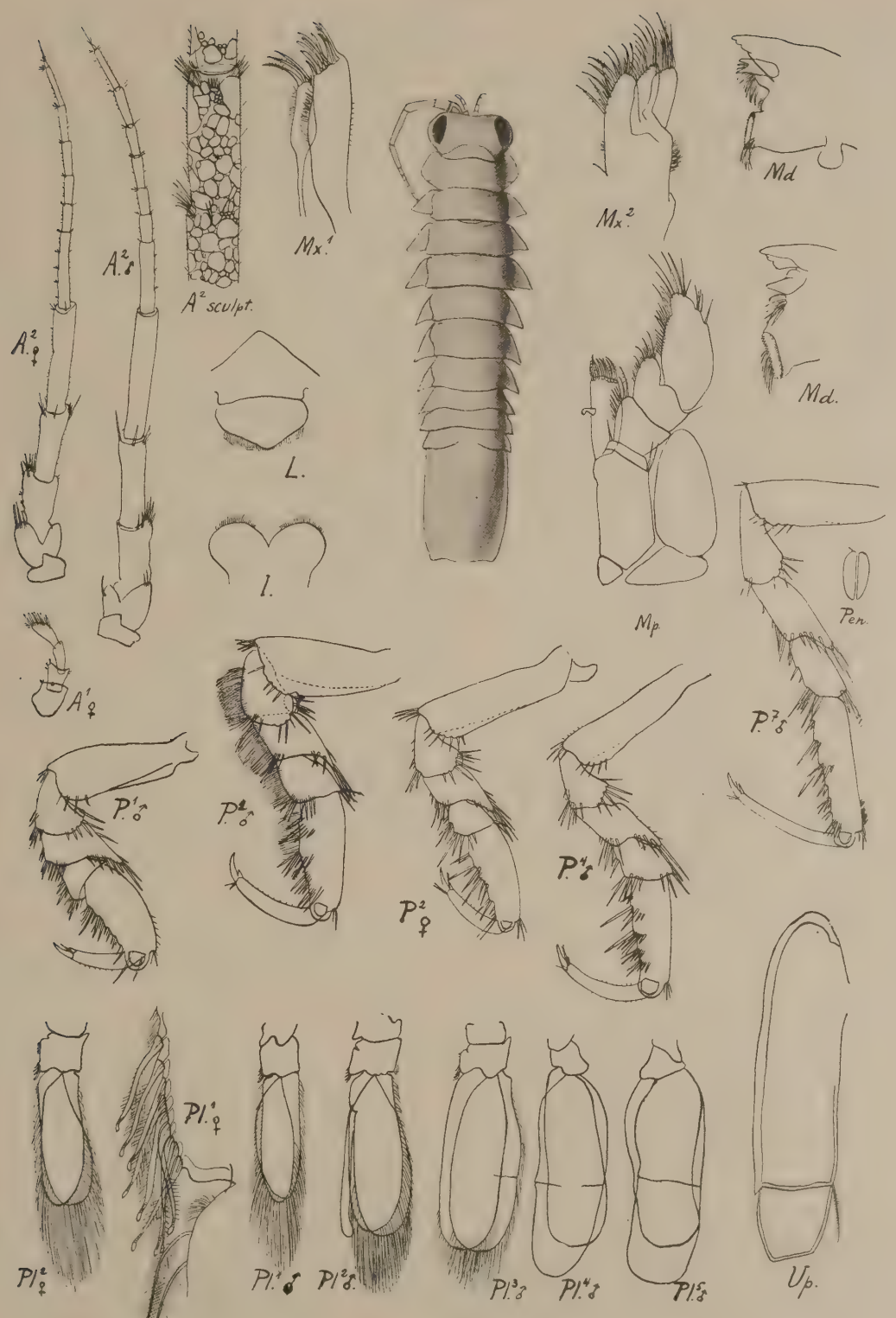

Fig. 4. Idotea metallica. *A² sculpt.* = the sculpture of a joint of A². *Pen.* = penis.

St. 172. *41°32′ N, 29°24′ E.* 11-8-1910.
10 m. w. 3^{50} am. 15 min. 188 ♂♂ 18—31 mm., 120 ♀♀ 18—24 mm.
50 m. w. 2^{25} am. 15 min. 606 ♂♂ 18—29 mm., 215 ♀ 18—24 mm.; 75 spec. 3—4 (6) mm.
100 m. w. 2^{50} am. 15 min. 94 spec. 22—28 mm, 40 spec. 3—4 mm.
600 m. w. 2^{05} am. 20 min. 54 spec. 18—27 mm, 6 spec. 3—5 mm.
St. 173. *41°17′ N, 29°11′ E.* 11-8-1910. 65 m. 6^{30} am. 15 min. 65 m. w. 1 ♀ (with eggs). 20 mm.
St. 174. *40°54′ N, 28°53′ E.* 11-8-1900, 120 m. 11^{50} am. 65 m. w. 30 min. 2 ♀♀: 19 mm (with eggs) and 25 mm (with young).
St. 175. *40°48′ N, 27°59′ E.* 11-8-1910. 1103 m.
10 m. w. 9^{45} pm. 15 min. 1 ♀ 25 mm, 2 ♂♂ 13—15 mm, 3 spec. 4—8 mm.
35 m. w. 10^{15} pm. 15 min. 1 spec. 6 mm.
100 m. w. 10^{45} pm. 15 min. 1 spec. 3 mm.
St. 176. *40°45′ N, 27°43′ E.* 12-8-1910. 560 m. 4^{00} am. 30 min. 65 m. w. 1 spec. 4 mm.
St. 178. *40°16′ N, 26°32′ E.* 12-8-1910. 68 m.
10 m. w. 0^{40} pm. 15 min. 1 ♀ (without eggs) 20 mm.
65 m. w. 0^{20} pm. 15 min. 1 ♀ (with eggs) 19 mm, 1 spec. 6 mm.
St. 208. *40°18′ N, 3°20′ E.* > 1600 m. 28-8-1910. Surface. 4 ♂♂, 11—16 mm.
St. 340. ("Pangan" 2). *35°50′ N, 21°30′ E.* 26-8-1911. 9^{00} pm 28 m. w. 1 ♂, 19 mm.
St. 341. ("Pangan" 3). *34°00′ N, 26°20′ E.* 27-8-1911. 11^{00} pm 28 m. w. 1 ♀ (with eggs), 14 mm.

The determination of this species proved at first a matter of some difficulty, owing to the fact that all the specimens — with the exception of those from St. 208 and St. 341, which had exactly the same outline as the figure given by Dollfus, l. c. — were far narrower than they should be according to the statements and illustrations published. On closer examination, however, it was found that this character was the only one in which the specimens from the "Thor" deviate from the normal, so there can be no doubt that all of them actually belong to the species in question.

Krøyer l. c. 1846 (1849?) gives some more or less schematic illustrations of a part of the appendages; other writers content themselves with figures of the outline. I have therefore dissected both ♂ and ♀, and now give illustrations of all the appendages.

In contrast to most other Idoteidæ, there is but very little difference in outline between individuals of the one sex and those of the other; the mesosome of ♀ is only very slightly broader than that of ♂. The surface is finely scaled; this character is shown in a detail figure of 2 Ant. The 2. Ant. of ♂ is only very little longer than that of ♀, and has one joint more in the flagellum (7 and 6 respectively). The pereiopoda are somewhat weaker in ♀ than in ♂; the only essential difference, however, is that ♂ has a close covering of thin, but stiff setæ on the inner edge of 2—5 joints of p. 2. For the rest, reference may be made to my illustrations.

Biology. On comparing the yield of the different hauls made at St. 172, it is here especially noticeable that the species keeps near the surface, which, by the way, as far as can be seen from works on the subject, is also evident from all previous investigations. As by far the greater number of specimens were taken in the waters about the Sea of Marmora and adjacent parts of the Black Sea, the following biological results are based exclusively on individuals from this region (St. 171—178). They may be divided into two groups according to size; 3—4 (6—8) mm. and 18—31 mm. All the small specimens appear to be newly born young, those found in the marsupia of ♀♀ being of the same size, as a rule about 3 mm. As, moreover, a large number of ♀♀ have either ova or young in the marsupion (of the large specimens taken at St. 172, 100 and 600 m. w., abt. 10% were ♀♀ with ova) it is evident that the egg-laying period falls at the beginning of August, and the ova appear to develop very rapidly into young. In view of the great difference between the sizes of the two groups, it would seem that the larger ones must be about 1 year old, and thus propagate at this age. ♂♂ appear to attain a somewhat larger size than ♀♀ (18—31 mm. as against 18—24 mm.)

Distribution: The species is apparently cosmopolitan, being found in almost all seas, and even off the W. coast of Greenland. A synopsis of the distribution will be found in my Conspectus Crust. et Pycnog. Groenlandiæ (Meddel. om Grønland vol. 22, 1913) p. 236. The most recent find which I have been able to discover in extant works is from Saldanha Bay, Cape Colony (Tattersall, Transact. R. Soc. Edinburgh, vol. 49, pt. 4 No. 16, 1913, p. 889).

IDOTEA BALTICA Pallas.

Oniscus balticus Pallas, Specilegia Zoologica 1772, p. 67, Pl. 4, fig. 6.
Idothea tricuspidata Desmarest, Dictionaire des Sci. Nat., vol. 28, 1823, p. 373, Pl. 46, fig. 11.
— — Dollfus, Les Idot.; Feuille des jeunes Naturalistes, vol. 24, 1895, p. 39, fig. 19, p. 55.
— — *marina* Miers, Revision Idot.; Journ. Linn. Soc. London, Zool., vol. 16, 1893, p. 25 (*ubi lit. et syn.*).
* — *baltica* G. O. Sars, Account vol. 2, 1899, p. 80, Pl. 32.
— — — Richardson, Monograph Isop. N.-America 1905, p. 364 (*ubi lit. et syn.*) fig. 394—95.
— — Tattersall, Isop.; Nord. Plankton, vol. 6 (Lief. 14), 1911, p. 219, fig. 83—87.

St. 41. *39°10′ N, 9°35′ E.* On the shore. 2-2-1909. 1 spec.

Also found: Eastern N. America; almost the whole of the European coast from Norway to the Black Sea (G. O. Sars l. c.).

Genus STENOSOMA.

Literature *vide* Tattersall, Isop.; Nord. Plankton, vol. 6 (Lief. 14) 1911, p. 230. — Dollfus, Les Idotheidæ des côtes de France; Feuille des jeunes Naturalistes, ser. 3, vol. 25, No. 289, 1894, p. 5, 54.

Of the 4 species belonging to this genus which Dollfus (l. c.) mentions as French, 3 are represented in the material from the "Thor", the fourth, however, *S. lancifer* Leach, is wanting.

There being 2 specimens of 2 of the species from the "Thor", I have dissected one of each in order to investigate the relation to the genus Idotea. The principal difference, apart from the abdomen, seems to be that the protuberance on the upper side of Md. is much larger than in the *Idotea* (*vide* Sars, Account, vol. 2, 1899, pl. 32). Of the genus *Idotea* I have only had occasion to dissect *I. metallica* (*vide supra*). In this species, Plp. 3 is furnished with natatory setæ, as in the case of Plp. 1—2, whereas in the two species of *Stenosoma* dissected, these setæ are not found on Plp. 3. This has doubtless some connection with the fact that the 3 first pairs of Plp. in the *Idotea* are connected in pairs, by means of crooked spines at the median edge of the 2. stem-joint, whereas in the *Stenosoma*, this only applies to the two first pairs of Plp. By means of these spines, each pair of the appendages in question will be moved together. Furthermore, the articulation of the exopodite in Plp. 3—4 is more distinct in *Idotea* than in *Stenosoma*; in Plp. 5, the articulation of 2 joint is actually complete. The pereiopoda of ♂ lack the abundant setose covering which may be found in *Idotea*.

STENOSOMA CAPITO Rathke. (Fig. 5 *partim*, fig. 6).

Leptosoma capito Rathke, Zur Fauna d. Krym; Mém. Acad. St.-Petersbourg, vol. 3, 1837, p. 384, Pl. 6, fig. 7—9.

Idotea angustata Lucas, Hist. Nat. des Animaux Articulés de l'Algérie; Explorat. Scient. de l'Algérie, Zool., vol. 1, 1849, p. 62; vol. 4, Pl. 6, fig. 3.

— *acuminata* var. *lanciformis* Miers, Idot.; Journ. Linn. Soc., London, Zool., vol. 16, 1883, p. 61.

**Stenosoma capito* Dollfus, Feuille de jeunes Naturalistes, vol. 25, 1894—95, p. 5, fig. 11, p. 54 (*ubi lit. et syn.*).

non — *acuminatum* Leach, *teste* Norman, Brit. Isop.; Ann. Mag. Nat. Hist., ser. 7, vol. 14, 1904, p. 444.

St. 17. *37°49′ N, 23°27′ E.* 55 m. 30-12-1908. 2 ♂♂. 15—17 mm.

The species is easily recognisable from others of the genus by the perpendicular horn between the eyes and the marked sculpture of the back. The two specimens agree on the whole very well with the descrip-

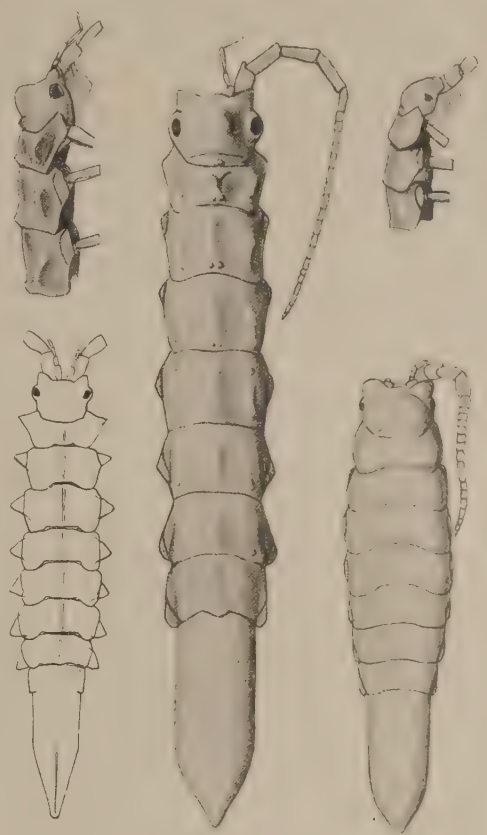

Fig. 5. *Genus* Stenosoma.
S. capito. S. acuminatum. S. capito. S. appendiculatum. S. acuminatum.

tions given by Rathke and Dollfus; there are, however, certain deviations. Rathke has overlooked the quite short proximal joint in the peduncle of Ant. 2; the flagellum has 19 short joints. The abdomen is, save for the pointed end, almost cylindrical, and is not, as shown in all the figures above quoted, slightly expanded in front of the point.

There being no analytical figures extant, I have dissected one of the specimens, and give drawings of all the appendages.

Also found: Mediterranean, among algæ; Nice, Villefranche, Cannes, Marseille, Banyuls, Porto Vecchio (Dollfus l. c., Adriatic (Norman l. c. 1904) Crimea (Rathke l. c.).

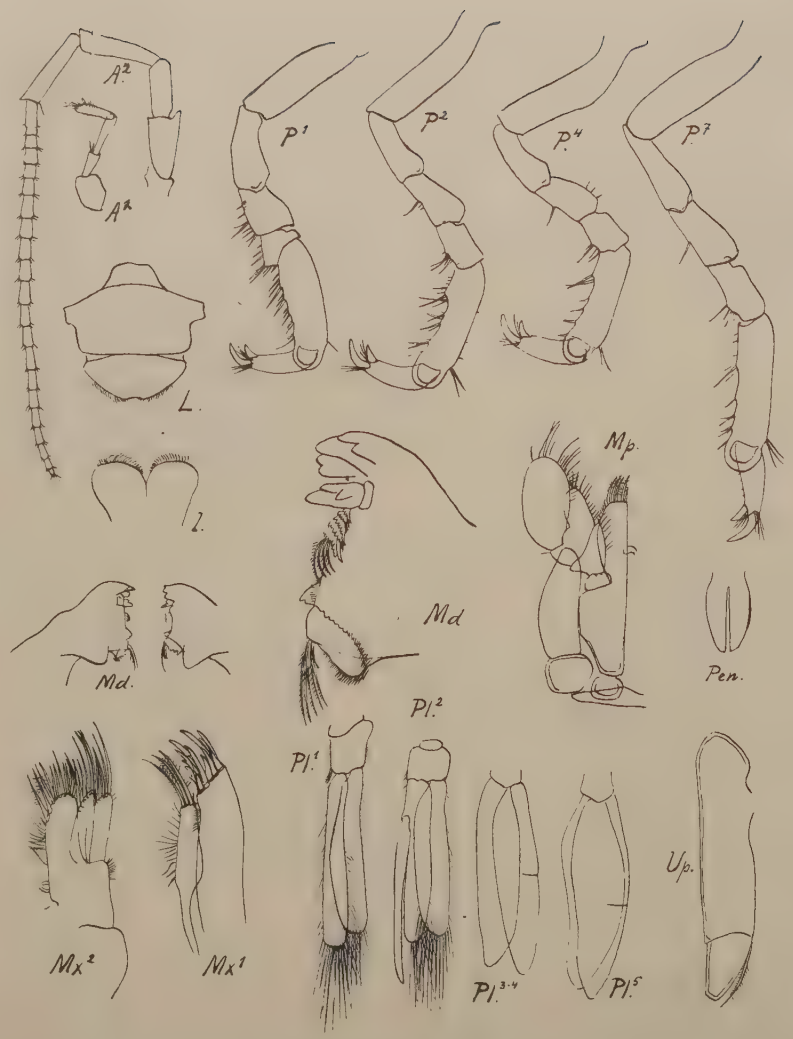

Fig. 6. Stenosoma capito. *Pen.* = penis.

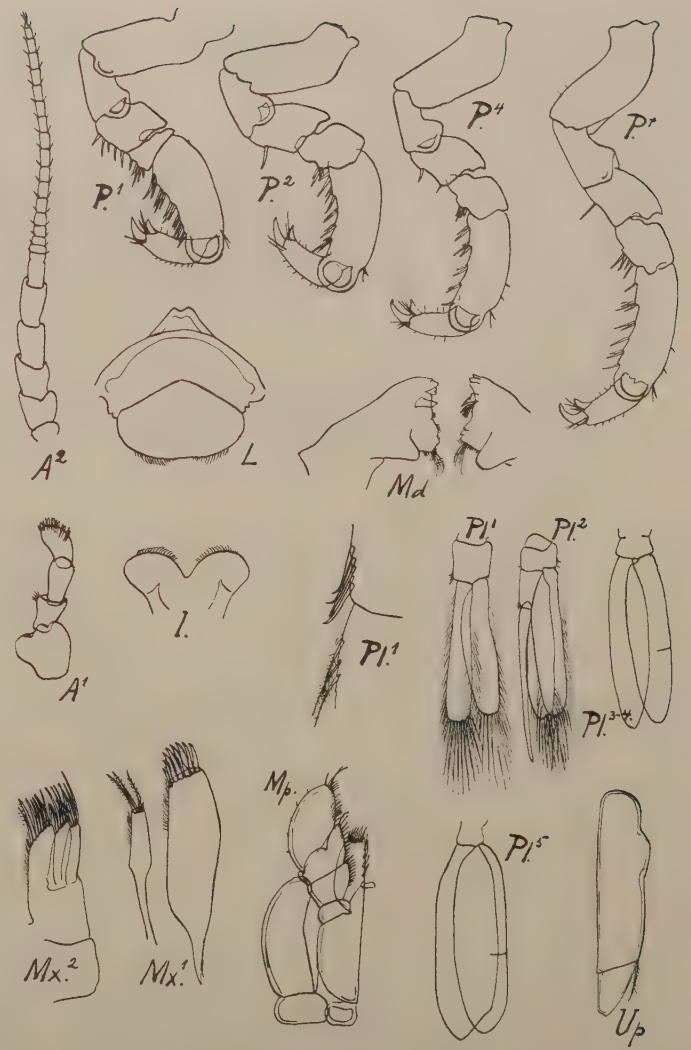

Fig. 7. Stenosoma acuminatum.

STENOSOMA ACUMINATUM Leach

(Fig. 5 *partim*, fig. 7).

Stenosoma acuminatum Leach, Crustaceology, in Edinburgh Encyclopedia, vol. 7, 1814, 433.

Idotea — Bate & Westwood, British sessile-eyed Crust., vol. 2, 1868, p. 394, with fig.

— — Miers, Idoteidæ; Journ. Linn. Soc., London, Zool., vol. 16, 1883, p. 59.

**Stenosoma* — Dollfus, Idot.; Feuille des jeunes Naturalistes, vol. 25, 1894—95, p. 5, fig. 14, p. 54 (*ubi lit.*).

* — — Tattersall, Isop.; Nord. Plankton, vol. 6 (Lief. 14), 1911, p. 231, fig.

St. 44. Galita's E. side, on the shore. 5-2-1909. 2 ♂♂: 11—12,5 mm.

This species is known by its almost cylindrical body, which is nearly devoid of sculpture. The frontal part is slightly domed, but without a projecting horn. The two specimens from the "Thor" agree well enough with the figures and descriptions given by Dollfus and Tattersall, being, however, somewhat broader than Dollfus' figures; the abdomen again, is by no means so sharply pointed. The flagellum of ant. 2 has, in the specimen drawn, 17 short joints (Tattersall gives abt. 10).

Here again, as in the case of the other species, no analytical figures exist; I have therefore dissected and drawn one of the specimens; it will be noticed that there is a considerable similarity to *S. capito*, the appendages being, however, far thicker and heavier.

Also found: St.Aubins (Jersey, Channel Islands) (Koehler: Faune maritime des Îsles Anglo-normandes 1885).

STENOSOMA APPENDICULATUM Risso

(Fig. 5 *partim*.).

Leptosoma appendiculata Risso, Hist. Nat. de l'Europe Mirid., vol.5, 1826, p. 107, Pl. 4, fig. 23.

**Stenosoma appendiculatum* Dollfus, Idot.; Feuille des jeunes Naturalistes, vol. 25, 1894—95, p. 5, fig. 12, p. 54 (*ubi lit.*).

non Idotea appendiculata Bate & Westwood, British sessile-eyed Crust., vol. 2, 1868, p. 396, fig.

St. 106. *36°53′ N, 2°00′ W.* 24-6-1910. 1150 m. 0^{20} am. 1200 m. w. 1 spec., 11 mm.

This species, which, in contrast to the two previously described, is hyaline and transparent, is easily recognised by its greatly applanated form, its large triangular coxal plates, and the small incision on either side of the proximal end of the abdomen. The specimen from the "Thor", which is unfortunately somewhat defective, is slightly narrower than shown in Dollfus' figure, the abdomen also being less sharply pointed at the hinder end. The specimen here described, despite its having been kept in spirits for 4 years up to time of writing, is still almost as transparent as glass.

There can be no doubt that Risso's species really is the same as Dollfus'. True Risso's figure (dorsal view) mostly resembles a sort of hybrid form between *S. capito* and *S. appendiculatum* Dollfus, while his figure and text make no mention of the incision on either side of the abdomen; he does, however, state that it is hyaline and pellucid, which would not apply to the other species.

The colour when alive is said to be a fine green (Risso).

Also found: Mediterranean (rare); Marseilles, among algæ (Dollfus).

Fam. ARCTURIDÆ=ASTACILLIDÆ.

Literature and key to the species, *vide* Stebbing, South African Crust. pt. 4 (Ann. S. African Museum, vol. 6, pt. 1, 1908, p. 50-52) and R. Koehler, Arcturidés nouveaux (Bull. Inst. Océanogr. Monaco, No. 214, 1911) p. 1 *seq.* Koehler points out (l. c. p. 3 *seq.*) the great systematic importance of the number of marsupial plates (oostégites); *vide infra*.

Genus ASTACILLA.

Of this genus, of which 15 species are hitherto known, 2 (1) will be found represented among the material from the "Thor". Of these, the one, *A.*(?) *Bonnierii* is new to science.

The species hitherto known are:

A. longicornis Sowb., see Sars, Account vol. 2, 1899, p. 88, Pl. 36.

A. arietina G. O. Sars, l. c. 1899, p. 90, Pl. 37, fig. 1.

A. affinis G. O. Sars = *A. intermedia* Goods.; Sars, l. c. 1899, p. 90, Pl. 37, fig. 2.

A. pusilla G. O. Sars, l. c. p. 91, Pl. 37, fig. 3.

A. granulata Harger = *A. americana* Harger; Richardson, Monogr. Isop. N.-America 1905, p. 324.

A. coeca Benedict; Richardson, *ibid.* p. 326.

A. Deshayesii Lucas; see later on; p. 20.

A. amblyura Stebbing, Isop.; Ceylon pearl oyster report, vol. 4, 1905, p. 46, Pl. 11, fig. B.

A. Bocagei Nobre, Ann. Sci. Nat. Porto, vol. 8, 1903, p. 93, Pl. 1.
*A. falclandica** Ohlin, Svenska Magellan-Exp., vol. 2, 1901, p. 266, Pl. 20, fig. 1.
*A. magellanica** Ohlin, *ibid.* p. 263, Pl. 20, fig. 2.
A. diomedeæ Benedict, Proc. Biol. Soc. Washington, vol. 12, 1898, p. 50, fig. 10.
A. marionensis Beddard, Challenger Isop. 1886, p. 107, Pl. 25, fig. 5.
A. mediterranea Koehler, Arcturidés nouveaux; Bull. Inst. Océanogr. Monaco, No. 214, 1911, p. 44, fig. 25—29.
A. dilatata Richardson, Proc. U. S. Nat. Mus., vol. 37, 1909, p. 96, fig. 22.
[*A. Giardi* Bonnier (Ann. Univ. Lyon 1896, p. 581, Pl. 32, fig. 3—4, is by Koehler l. c. 1911 referred to a new genus, *Arcturopsis*].

The most important character in the new species taken by the "Thor" is the almost complete fusion of the foremost segment of the body with the head (the epimeral part, however, being entirely free). This character, which should perhaps, after all, only be taken as specific, is, — apart from the number of marsupial plates, further referred to below — the only one in which this species differs from the diagnosis given by Sars in his Account (vol. 2, p. 87) of the genus *Astacilla*.

As will be seen from my figures (fig. 8), this new species distinctly exhibits 4 pairs of marsupial plates. Stebbing gives (l. c. 1908, p. 51—52) a classification list of the species of *Astacillidæ*, based on the number of marsupial plates; according to this, (as also G. O. Sars, in the Account) the *Astacilla* should have only a single pair (on 2. pair of pereiopoda); Koehler, however (l. c. 1911, p. 3) gives 3 pairs (on 2—4 pairs of pereiopoda). In order to ascertain which statement is correct, I have gone through the whole material of *Astacilla* species contained in the Zoological Museum at Copenhagen. We have ♀♀ of the species *A. affinis* G. O. Sars, *A. granulata* Harger, and *A. longicornis* Sowb. I have unfortunately only been able to dissect ♀♀ of the last-named species; this exhibits distinctly 3 pairs of plates. The whole of the material in the museum of the other two species is being dealt with by Dr. H. J. Hansen for the Ingolf Expedition, and I did not therefore feel justified in dissecting. On superficial investigation of ♀ of these two species, I have only been able to discover the 2 pairs of plates (on p. 3—4) this, however, I can only consider as of slight importance, as the plate on p. 2 would certainly be small, and partly concealed beneath the next pair (this is, at any rate, the case with *A. longicornis*).

With its partial fusion of the head with the first segment of the body, as well as the four pairs of marsupial plates, the present species from the "Thor" resembles *Astacilla* (*Arcturopsis*) *Giardi*, Bonnier (Edriophthalmes du "Caudan"; Ann.Univ.Lyon, vol.16, 1896, p. 581, Pl. 32, fig. 3—4). True, Koehler says, in Arcturidés nouveaux (l. c. 1911) p. 6—7, that *A. Giardi* has in reality only 3 pairs of plates; this statement, however, I must pass over, having no material of the species in question.

Koehler (l. c. 1911, p. 8) takes *Astacilla Giardi* as belonging to a new genus, *Arcturopsis*, together with I new species distinguished by himself. For generic diagnosis see Koehler, p. 8.

Of the species from the "Thor" we have only 2 ♀, no ♂; it is thus impossible to determine whether the remarkable copulatory organ referred to by Bonnier (l. c. 1896) and Koehler is also found in the present species. ♂ can thus not be used for purposes of generic determination. ♀ does not agree with Koehlers diagnosis of the genus *Arcturopsis*, the fourth segment of the body not being much broader at the fore end than at the hinder do., but on the contrary, almost cylindrical in form.

Despite the uncertainty of the generic classification, I suggest that the new species should for the present be taken as belonging to the genus *Astacilla*; elucidation of the actual facts of the case must unfortunately be left to the future.

ASTACILLA (?) BONNIERII n. sp. (Fig. 8).

St. 66. *36°16′ N, 6°52′ W.* 735 m. 25-2-1909. 8^{00} am. 2 spec. (♀).

Of all the species of *Astacilla* described (the descriptions of Ohlin's 2 species however, I have, as already mentioned, been unable to consult) the present species resembles in externals mostly *A. longicornis* Sowb. (Sars, Account, vol. 2, 1899 p. 88, Pl. 36) but is altogether somewhat stronger, as will readily be seen on comparing Sars' and my figures together. The species is almost entirely smooth; the quite small protuberance in the centre of the hinder edge of the three posterior segments of the body is distinctly shown in my figures, which, by the way, exhibit all such features as I have been able to observe.

Both the specimens in question are ♀, abt. 9,5 mm. long. They are fairly soft. I have named the species after the French zoologist, the late J. Bonnier.

See also the remarks above as to genus *Astacilla*.

* I have been unable to obtain the description of these two species. Both the University Library and the Royal Library at Copenhagen lack that part of the 2nd Volume of the Magellan Expedition containing Ohlin's work. On inquiring of the publishers (Norstedt och Sõner, Stockholm) I received the astonishing reply that the part in question could not be procured!

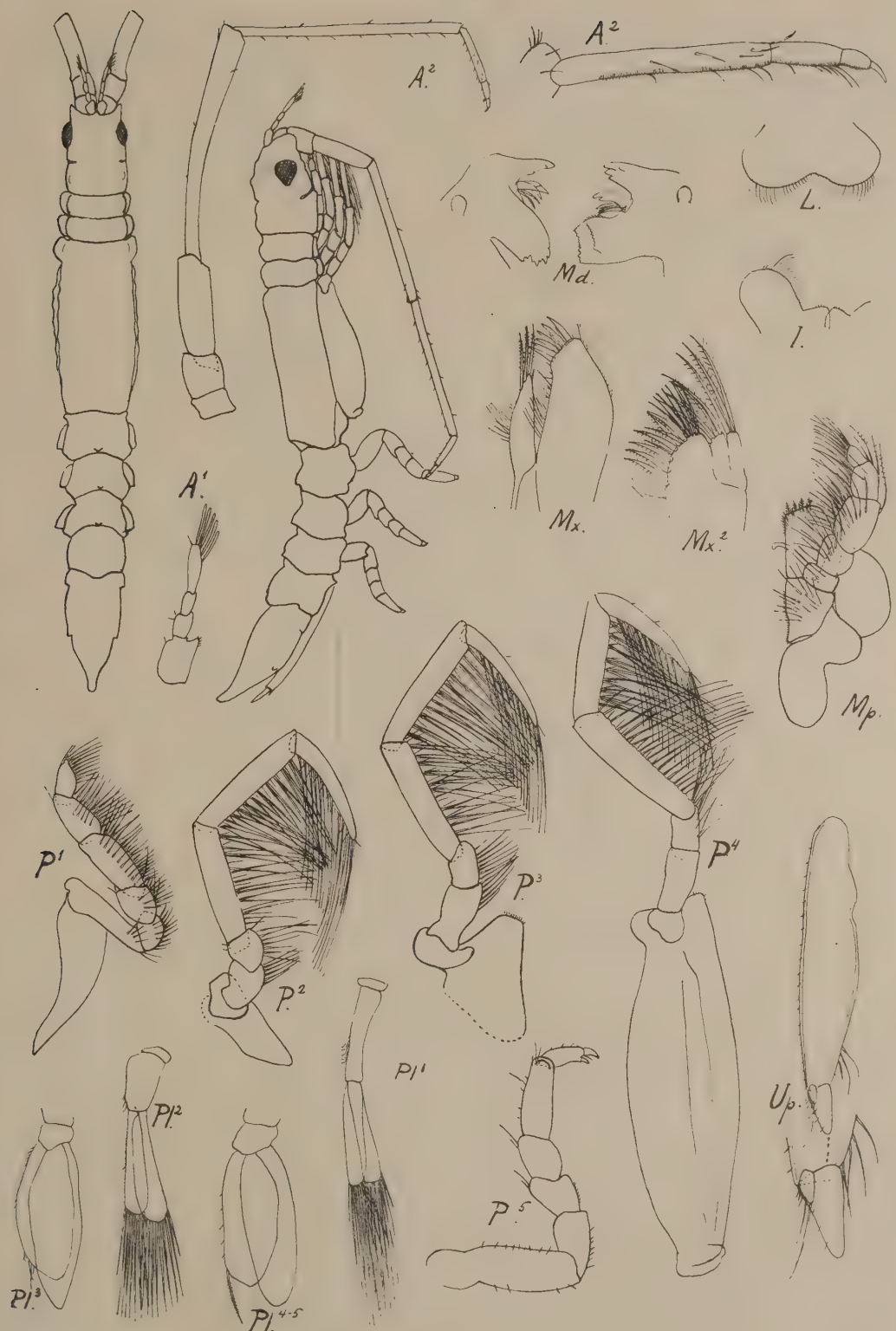

Fig. 8. Astacilla (?) Bonnierii ♀. *Mx* = 1. Mx.

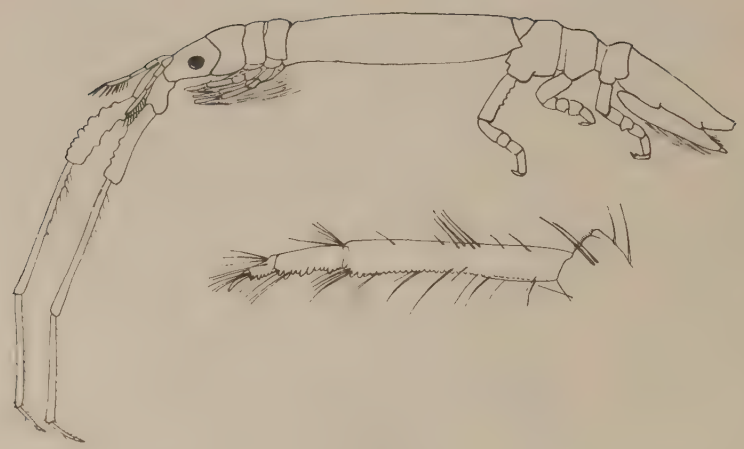

Fig. 9. Astacilla Deshayesii and the apex of Ant. 2.

ASTACILLA DESHAYESII Lucas. (Fig. 9).

**Arcturus Deshayesii* Lucas, Animaux Articulés de l'Algérie, 1849, vol. 1, p. 59, vol. 4, Pl. 5, fig. 7.

— *gracilis* Stebbing (*non* Goodsir), Sessile-eyed Crust. of Devon; Transact. Devon Assoc. Advanc. Science, 1874, p. 8, fig. 2—4.

— *linearis* Stebbing, Notes on Sessile-eyed Crust.; Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 36.

Astacilla Deshayesii Stebbing, Hist. of Crust. 1893, p. 371.

* — — Norman & Scott, Crust. of Devon and Cornwall 1906, p. 47, Pl. 5, fig. 6—10.

— — Koehler, Arcturidés nouveaux; Bull. Inst. Océanogr. Monaco, No. 214, 1911, p. 3, 4, 5, fig. 1b.

St. 107. *36°13′ N. 1°28′ W.* 25-6-1910. 2250 m. 300 m. w. 9^{05} am. 1 ♂, 11,5 mm.

As will be seen on comparing the figures, there is a slight difference in the arrangement of the protuberances on the antennæ between Lucas' specimens and that from the "Thor". I am nevertheless of opinion that there can be no doubt as to the correctness of my classification. I have further considered it most advisable to give a figure showing the point of 2 pair of antennæ, this portion being entirely different from the same as shown by Norman and Scott.

The animal was, strangely enough, taken pelagically (cf. relation between depth and length of wire).

Also found: S. England (Norman, Brit. Isop. 1904). W. of Gibraltar (Lucas). Adriatic (Claus).

3. Asellota.

Fam. IANIRIDÆ.

Genus IANIRELLA.

IANIRELLA BONNIERII n. sp. (Fig. 10).

St. 132. *38°57′ N, 9°47′ E.* 1227 m. Clay. 14-7-1910. Sifted bottom material. 5 ♀♀, 4 ♂♂, 2 sex undeterminable.

At the station above mentioned, the hauls made on board the "Thor" yielded parts of in all 11 individuals (of some of the specimens only portions are preserved) of a species closely related to *Ianirella Nanseni* Bonnier; Campagne du "Caudan" dans le Golfe de Gascogne, Edriophthalmes; Ann. de l'Univ. de Lyon, 1896, p. 537, Pl. 33, fig. 1).

The accompanying figures show all that I have been able to observe; I may therefore restrict myself to emphasising certain points, especially those features in which the species differs from *I. Nanseni*. Bonnier's description is also very complete, and his statements regarding the oral parts, etc. may on the whole also apply to the present species.

We have, in works extant up to time of writing, descriptions of 4 species belonging to this genus, *viz*, besides *I. Nanseni* Bonnier, the following 3 (a freshwater species, *vide infra*): *I. lobata* H. Richardson (Proc. U. S. Nat. Mus. vol. 35, 1909, p. 78—79, fig. 8—11), *I. glabra*, H. Richardson (Isop. "Travailleur" et "Talisman"; Bull. Mus. d'Hist. Nat. Paris 1911, No. 7, special ed. p. 10, no fig.) and *I. abyssicola* H. Richardson (*ibid.* 1911, p. 11, no fig.).

The outline is exactly the same as that of *I. Nanseni*: the new species differs, however, in having no dorsal spines, the back being almost perfectly smooth, save for a very fine, faintly raised reticulation, and occasional setæ. The frontal spine and all the lateral processes, on head, segments of body, and pleon, terminate in a thick, apparently soft, injointed spine; those situate on the edge of the lateral processes however, are not thick and heavy as in *I. Nanseni*, but quite thin.

No trace whatever of eyes is be found.

Ant. 1 has in the largest individuals 8 joints in the flagellum, otherwise 7. Of ant. 2, only the proximal segments of the stem are preserved; 3. segment has a small antennal scale, (found neither in the description nor in the drawing of *I. Nanseni*.)

With regard to the oral parts, there is nothing particular to note beyond the remarkable spiny armour on the molar process of the mandibles. Only the left mandible is drawn, the right being of exactly

Fig. 10. Ianirella Bonnierii. *Ceph. sculpt.* = the sculpture of the cephalon. *Ant. 1* is by a misprint called *Ant. 2*, and vice versa.

the same form, save that the lacinia mobilis is naturally lacking in this. The pereiopoda are wanting entirely, with the exception of 1. segment. The operculum is, both in ♂ and ♀, somewhat longer than that of *I. Nanseni*, reaching in both sexes almost out to the point of the pleon. With regard to the uropoda, there is nothing particular to remark. The length is 4—5 mm., colour (in alcohol) white.

This new species I have named after the French zoologist the late Jules Bonnier, who has given an excellent description of the type species of the genus.

One of the specimens had, attached to the under side of the head or one of the foremost rings, an almost spherical *Rhizocephalid*; unfortunately, it fell off at the moment of commencing investigation.

Remarks. Of the two species last described by Miss Richardson, there are, unfortunately, no illustrations available, there being, moreover, only a single specimen of each species, both of these defective.

In the following table, I have attempted to give a brief survey of the species belonging to this genus:

1.	Lateral processes rounded	*I. lobata.*
1.	— — pointed	2
2.	With dorsal spines.	*I. Nanseni.*
2.	Smooth backed	3
3.	Besides the small process at the basis of the uropoda, the pleon has on either side:	
	3 lateral processes	*I. glabra.*
	4 —	*I. Bonnierii.*
	5 — —	*I. abyssicola.*

Dr. H. J. Hansen will, in the Isopoda from the Danish Ingolf-Expedition, describe a new, smooth backed species.

Genus Ianirella. Sayce has, in Proc. Soc. Victoria, vol. 13, 1900, evidently in ignorance of Bonnier's work quoted above, formed a new genus with the same name as Bonnier's, in order to include a new

species, *I. pusilla*, from fresh water in Victoria. (Unfortunately, I have been unable to obtain access to Sayce's work, and an application to the author proved fruitless). In view of this common denomination of two genera, Miss Richardson suggests, in Proc. U. S. Nat. Mus., vol. 27, 1904, p. 6, that the name *Heterias* be adopted for the marine species (only *I. Nanseni* being then known); evidently, however, Miss Richardson has relinquished this idea, having subsequently, as above mentioned, designated 3 marine species as *Ianirella*.

Fig. 11. Desmosoma chelatum.
Sculpt. Segm, 5 = the sculpture of the 5. segment.

Fam. DESMOSOMIDÆ.

Genus DESMOSOMA.

DESMOSOMA CHELATUM n. sp. (Fig. 11).

St. 126. *42°43′ N, 9°50′ E.* 600—620 m. 10-7-1910. 10^{10} pm. 25 m. w. 1 spec. (♀, 4,5 mm).

The *Desmosoma* species hitherto described in extant works are as follows:

D. lineare G. O. Sars, described in Account vol. 2, 1899, p. 125, Pl. 53, Pl. 54, fig. 1.

D. armatum G. O. Sars, *ibid.* p. 127, Pl. 54, fig. 2.

D. angustum H. J. H., *ibid.*, p. 250, Suppl.-Pl. 2, fig. 2, Suppl.-Pl. 4, fig. 2.

D. elongatum Bonnier, Edriophthalmes du »Caudan«; Ann. Univ. Lyon, 1896, p. 605, Pl. 34, fig. 3.

Among the Isop. from the Danish Ingolf-Expedition, which Dr. H. J. Hansen is at present working up, will be found about ten new species.

The specimen from the "Thor" is at the very first glance distinguishable from the species described, by the remarkable shape of p. 1; in other respects, however, it agrees well with the characterization given by Sars (Account, vol. 2, p. 124) of the genus *Desmosoma*. Having had but a single specimen at my disposal, I have not subjected this to dissection, and can therefore furnish no description or illustrations of the oral parts, or of the pleopoda.

The body is somewhat broader in proportion than in the other species, the length being 3 or 4 times the breadth. The cephalon is comparatively narrow; the neck in particular is unusually long. (It should be noted that in drawing habitus figure, dorsal view, the animal has not been subjected to pressure from the cover glass). The 3 first segments in the mesosome are of equal length, the fourth half as long again; these four segments extend laterally in a pointed process: 1. segment of the respective legs. The three posterior segments are longer than the anterior; all 7 are sharp-edged, the lateral edges of the cephalon and urosome however, being evenly rounded. 1. ant. has only four joints; of these, the second is as long as the three others together. Of 2. ant., only the 4 short proximal segments are preserved. 1. pair of pereiopoda are very strong, almost forming a chela, the 5th joint bearing a strong spine equal in length to 6. joint. At a casual glance, when the articulation of this spine is not noticed, the whole presents almost the appearance of a decapod claw. P. 2—7 are of the usual shape, size decreasing from p. 2 to p. 4; p. 5 — p. 7 are of approximately the same length as p. 4. The uropoda have two joints, the second being almost half as long again as the first, and somewhat thinner. In a figure showing the anterior lateral process on the 5. segment of the body, I have indicated the slight folds in the sculpture of the body.

Length, 4—5 mm. Colour, (in Alcohol) whitish, semitransparent; very soft.

The specimen was found east of the northernmost point of Corsica. This is, as far as I have been able to see from extant works, the first find of a *Desmosoma* made in the Mediterranean. It would moreover appear to be the first time any species of this genus has been taken pelagically, the others having, it seems, been taken on the bottom.

Fam. MUNNOPSIDÆ.

Genus MUNNEURYCOPE.

MUNNEURYCOPE TJALFIENSIS K. St. (Fig. 12, 13).

Munneurycope Tjalfiensis K. Stephensen, Report on the Malac. collected by the Tjalfe-Exped. .... especially at W.-Greenland; Vid. Meddel.Naturh. Foren. Kbhv., vol. 64, 1913, p. 99, fig. 6—8.

St. 62. *50°25′ N, 12°44′ W.* 2480—2775 m. 5-6-1906. 1500 m. w. 1 ♂, 2 ♀♀.
St. 65. *35°53′ N, 7°26′ W.* 1300 m. 24-8-1909. 1600 m. w. 0^{30} pm. 3 ♂, 2 ♀.
St. 74. *49°23′ N, 12°13′ W.* 1245—1298 m. 10-6-1906. 2000 m. w. 4 ♂, 9 ♀.
St. 76. *49°27′ N, 13°33′ W.* >2800 m. 11-6-1906. 2800 m. w. 6 ♂, 3 ♀, 3 of undeterm. sex.
St. 180. *48°19′ N, 13°53′ W.* 4000 m. 3-9-1906. 1800 m. w. 3 ♀, 1 of underterm. sex.
St. 181. *49°22′ N, 12°52′ W.* 1350 m. 4-9-1906. 1800 m. w. 5 ♂, 4 ♀.
St. 190. *46°30′ N, 7°00′ W.* 4000 m. 11-9-1906. 2700 m. w. 6 ♂, 3 ♀, 5 of undeterm. sex.

In the Report of the "Tjalfe"-Expedition (l. c.) where I have described this species on the basis of a single specimen (♂) very ill preserved, I have also included some illustrations; the figure and description there, however, are, owing to paucity and badness of material, far from satisfactory. I therefore propose to give a supplementary description here, with new drawings.

Eyes are wanting. Ant. 1 is about half the length of the whole body. In a ♂ having these antennæ in complete preservation, they appear to contain 55 joints. The first segment of the stem is large and thick, far heavier than the second; no. 3 is quite small. Then follows the flagellum with two long joints with a single, quite short one between them (this is not distinctly visible in all specimens) and thereafter, the small, short joints. It should be noted however, that it is not always possible, in the proximal portion of the antennæ, to distinguish with certainty between accidental breaks and true articulation; it is therefore not certain that all the markings shown in the figure as articulate divisions really are such, or that the two long joints not are combined by many small joints. In all the specimens, the flagellum of ant. 2 has been lost; the four joints which have been preserved are very thick, the third having a small antennal scale on the distal end of its lateral side. This last feature has not, as far as I am aware, hitherto been found in any *Munnopsid.*

The mandibles resemble very closely those of *Munnopsis Murrayi* Walker (Tattersall, Isop. Fisheries,

Fig. 12. Munneurycope Tjalfiensis. ♂.

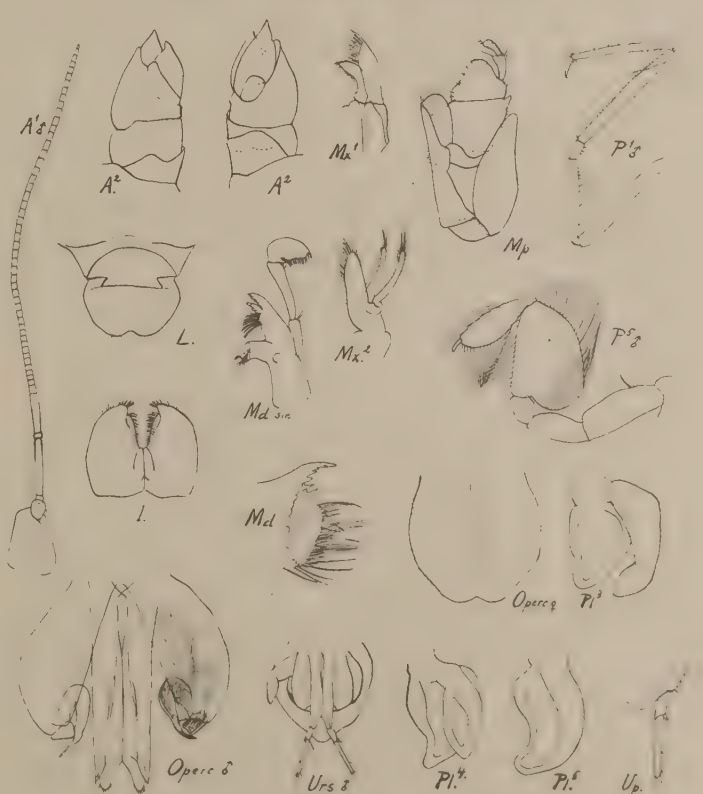

Fig. 13. Munneurycope Tjalfiensis.

Ireland, Scienst. Invest. 1904, pt. 2, 1905, p. 25, Pl. 5, fig. 8) and exhibit a great molar expansion, with indentations on the one side, the other having an array of stiff setæ. The part between the two edges is entirely covered with small warty protuberances. The two mandibles are entirely alike save for the lacinia mobilis, which is naturally only found on the left.

The maxillæ and maxillipeds are of the form typical for *Munnopsis*, as also p. 1, this last, however, being slightly longer than the whole of the body. Of p. 2 only a fragment is preserved, and this only in a single specimen (♂); the piece in question is almost twice the length of the entire animal. Of p. 3 and p. 4, we have only the first joints, which are much longer than in the case of *Munnopsis typica*. P. 3—p. 7 are almost exactly identical in shape with those of *M. Murrayi*, and have a distinct dactylus.

The operculum of ♀ is oval, with a small incision in the posterior edge, and a faint longitudinal carina. The shape of the operculum in ♂, and also the pleopoda, are distinctly shown in Fig. 13.

The distal segment of the uropoda is slightly more than twice the length of the proximal; there is a very small exopodite, which is easily overlooked, but has been found on closer examination to be similarly present in the specimen from the "Tjalfe".

The length varies from abt. 7 mm. to a little over 8 mm. (♂).

Remarks. I have myself, in the Report of the "Tjalfe"-Expedition, where a catalogue of references will also be found, endeavoured to make clear the systematic position of this species with regard to the genus *Munnopsis* and related species. A better survey is given by Tattersall, (to whom, however, this species was unknown) in Isop. Fisheries, Ireland, Scient. Invest. 1904, pl. 2 (1905) p. 24—25, and in Isop. Nordisches Plankton (vol. 6, Lief. 14, 1911) p. 186—87. The species is extremely closely related to *M. Murrayi* Walker (for references, see "Tjalfe" Exp., p. 99—102), differing however, in the palp of the maxillipeds, the median edge of 4. joint being somewhat concave, and the distal segment broadest towards its termination, not pointed. The exopodite is evenly rounded, not indented. In addition, the blackish brown or dark brown colour is doubtless also a specific character. True, neither Walker nor Tattersall make any statement regarding the colour of their specimens; they would, however, doubtless have done so had this been so unusual as in the present instance. Furthermore, the metasome of *M. Murrayi* is stated as having a blunt carina; no trace of any such is visible in the specimens here concerned.

Genus Munneurycope. This genus should probably only comprise *Munnopsis Murrayi* Walker and the present species; not, as suggested in the "Tjalfe" Expedition, also *M. oceanica* Tattersall and *M. longicornis* H. J. Hansen. It is closely related to *Munnopsis*, differing, however, in the following characters:

1. The outline of the body is oblong, without that sudden narrowing of the posterior segments of the body which is characteristic of most of the other species. 2. There is a small antennal scale (not known in the case of *M. Murrayi*). 3. Mandibles with cutting edge strongly dentate; setose lobe, and broad molar expansion present (Tattersall). 4. Second joint of p. 2 — p. 4 long, as in *Eurycope*, not short as in *Munnopsis typica*. 5. Natatory legs with a distinct dactylus (Tattersall). 6. Uropoda have a small exopodite (not described however in *M. Murrayi*).

Distribution. The specimen from the "Tjalfe" was taken near S. Greenland, *60°07′ N, 48°26′ W*, 2000 m. w. The species thus belongs to the deep Atlantic.

4. Epicarida.

Fam. DAJIDÆ.

Synopsis of genera and species: K. Stephensen, »Tjalfe«-Exped. Malacostraca; Vid. Meddel. Naturhist. Foren. Kbhv. vol. 64, 1912 (1913), p. 104—07.

Genus HOLOPHRYXUS.

HOLOPHRYXUS RICHARDI Koehler.

**Holophryxus Richardi* Koehler, Isop. nouveaux de la fam. des Dajides; Bull. Inst. Océanogr. Monaco, No. 196, 1911, p. 23—26, fig. 15—17.

— — K. Stephensen, »Tjalfe«-Exped. Malacostraca: Vid. Meddel. Naturh. Foren. Kbhvn. vol. 64, 1912, p. 108, fig. 9—10.

— sp. (*H. Richardi* Koehler?) K. Stephensen, *ibid.* p. 109, fig. 11—14.

St. 88. *48°09′ N, 8°30′ W*. 600—995 m. 300 m. w. 20-6-1905. 1 spec. (♀) without host.

The specimen, which is 8 mm. long, agrees well with my Fig. 9—10 in "Tjalfe" Expedition. The animal was found loose in a glass, not attached to any host, and is considerably shrunken.

After renewed examination of the specimens from the "Tjalfe" I have no longer any doubt that of the fact that *H. sp.* ("Tjalfe", p. 159) is really the adult *H. Richardi*.

Distribution. *64°22′ N, 56°00′ W*. 400—800 m. w.; *66°21′ N, 57°04′ W*. 680 m., 800 m. w. (K. Stephensen, "Tjalfe") — *33°41′ N, 36°55′ W*., 0—2500 m. (Koehler l. c.). The species thus belongs to the plankton of the Atlantic (lives on *Sergestes arcticus* Kr.).

Genus HETEROPHRYXUS.

HETEROPHRYXUS APPENDICULATUS G. O. Sars. (Fig. 14).

Heterophryxus appendiculatus G. O. Sars, Challenger Report, Zool. vol. 13, Schizop., 1885, p. 220, Pl. 38 fig. 8.

— — Giard & Bonnier, Sur les Epicarides de la fam. des Dajides; Bull. Sci. France et Belgique vol. 20, 1889, p. 284—85, textfig. 9 (copy of Sars' fig.).

* — — Tattersall, Isop.; Fisheries Ireland, Sci. Invest., 1904, pt. 2 (1905), p. 77, Pl. 11 fig. 1—4.

* — — Tattersall, Nord. Plankton, Lief. 14, vol. 6,1911 p. 247, fig. 146—49.

— — Tattersall, Schizop., Stomatop. and non-antarctic Isop. Scottish Nat.-Antarct. Exp.; Transact. Royal Soc. Edinburgh, vol. 49, pt. 4, No. 16, 1913, p. 891, fig. 14—15.

St. 66. *36°16′ N, 6°52′ W.* 25-2-1909. 735 m. 5^{15} am. 600 m. w. 1 ♀ with ♂.

The only good illustrated description of this species is that given by Tattersall l. c. 1904 (1905); a copy, translated, is found in Tattersall l. c. 1911. Sars' original figure, which is copied by Giard and Bonnier, is not particularly good, and his original description extremely brief.

The ♀ here in question, which is 5 mm. long, (excl. p. 5) was, with its attached ♂, found loose in a glass, not fixed to any host. The highly emarginated lateral parts beyond the epimeral plates indicate the animal as being of an age between those of the specimens drawn by Tattersall and Sars; unfortunately, however, neither of these writers makes any record as to the size of the specimens shown. My specimen differs from Tattersall's figure in having the cephalon drawn somewhat back from the anterior edge of the body, which appears to be formed by the pronounced projection of 1. pair of epimeral plates; the cephalon does not, however, contribute to the formation of this. A dark stripe runs down the centre of the back along the four anterior segments.

As no figure exists showing this species as seen from the ventral side, I have made a drawing, but have unfortunately not been able to give all details of oral parts and antennæ. Strange to say, the marsupial plates number not 5 but 6, there being one pair situate in front of those belonging to p. 1; this anterior pair, which thus belongs to the gnathopoda, (which I have not been able to find) are of approximately the same shape and size as those belonging to p. 1, but project only by a narrow edge. The marsupial plates, by the way, overlap but very little, and as they are pressed in to the body, the specimen must be comparatively young, and cannot yet have had ova. P. 5 is long and thin as in Tattersall's fig. (l. c. 1904) differing, however, somewhat from extant figures in the shape of the branches.

Distribution. This species, which lives on the back of the carapace of various *Euphausia*-species (see in particular Tattersall, l. c. 1913) is known from *0°22′ N, 18°43′ W; 6°43′ N, 25°48′ W.* (Tattersall 1913) Cape Verde Islands (Sars l. c.) Mediterranean (Lo Bianco 1903) Bay of Biscay, (Fowler) and W. Ireland (Tattersall 1904).

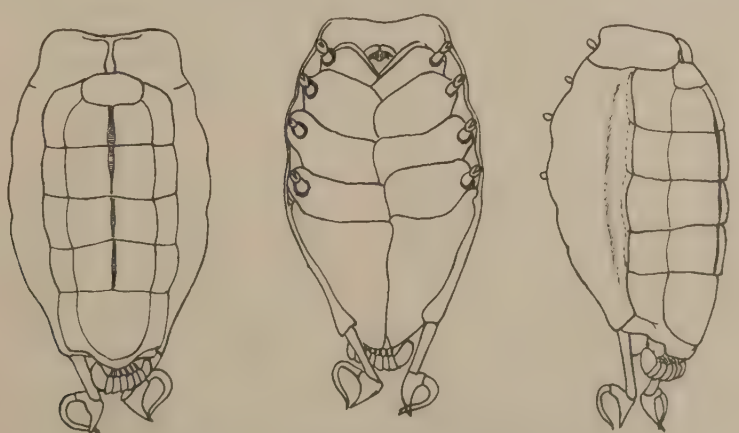

Fig. 14. Heterophryxus appendiculatus. Dorsal, ventral and lateral view.

TANAIDACEA.

As the "Thor" was chiefly occupied with the collecting of plankton, and only occasionally using the dredge, it is not to be expected that the yield of Tanaidacea should be very great, and as a matter of fact there are but 5 species represented in the material, including 1 n. sp.

Though insignificant in point of quantity, however, the material is all the more important in biological respects, a number of specimens having been taken pelagically. A feature of supreme interest is the fact that the pelagic occurrence has been verified as a certainty, the question being not merely one of biological but also of zoogeographical importance. H. J. Hansen mentions, among the Tanaidacea of the Ingolf Expedition (The Danish Ingolf Exped., vol. 3, pt. 3, 1913, p. 4—5) certain species, the occurrence of which is contrary to zoogeographical laws, inasmuch as they appear to belong both to the boreal southern and northern arctic ocean deeps off the coast of Greenland. I have myself, in a zoogeographical survey of the Malacostraca and Pycnogonida of Greenland (Meddel. om Grønland, vol. 45, 1912, p. 615) mentioned some Crustaceans, the distribution of which I was then unable to explain. The question has also been subsequently treated in my Conspectus Crust. et Pycnog. Groenlandiæ (Medd. om Grønland, vol. 22, 1913) p. 257—60, from the point of view that the geographically doubtful species were taken as plankton; I have also (l. c. 1913, p. 259) mentioned 5 Tanaidacea as to which I have succeeded in finding reliable records of pelagic occurrence in extant works. (I need hardly say that it is not my intention to assert that such species always are planktonic, but merely that they may occur as plankton). Dr. H. J. Hansen however, maintains that all Tanaidacea belong to the bottom fauna, despite the fact that the occurrence of the "doubtful" species is very easily explained if they are taken pelagically*. We are not justified in supposing that an animal must necessarily have been taken on the bottom because it happens to be found in a dredge; it might very well have been caught while the implement was being hauled in. I have myself, in Greenland, frequently found both medusæ and Sagitta in the dredge.

* It should be noted that the specimens taken pelagically by the "Thor" were caught at night (10^{10} p.m.) It is moreover a phenomenon of by no means infrequent occurrence, that deep sea creatures rise higher in the water during this part of the 24 hours.

As already mentioned, I have, in Meddel. om Grønland, vol. 22, 1913, p. 259, made reference to 5 Tanaidacea which had, according to published statements, been taken pelagically: I have since succeeded in finding the following three instances recorded, besides those from the "Thor".

Apseudes latreillei Southern part of North Sea, exact locality not stated (Bull. Rés. courses periodiques, Année 1904—05, No. 2, Novbr. 1904, p. 87, [cover dated erroneously 1905]; Conseil permanent internat. pour l'exploration de la mer). Also referred to in the Public. de Circonstance of the same institution, (No. 33, 1906, p. 103).

Apseudes spinosus 51°48′ N, 2°09′ E, 47, 32 m, horizontal net 44 mm (l. c. 1904, p. 87; l. c. 1906, p. 103).

Heterotanais crassicornis Siboga Exp. St. 43, Pulu-Sarassa, Postillon Island, vertical net 36—0 m, 2 spec. (Nierstrasz; Siboga-Isop. pt. 1, 1913, p. 40).

In addition, the following two species at least are passively pelagic (living on turtles).

Tanais robustus Moore, (taken by the "Thor" *vide infra*).

Tanais Dulongi Savigny (Audouin). Van Beneden, Notice sur la tortue franche (Chelonia midas) dans la mer du Nord, ses commensaux et ses parasites; Bull. Acad. Royale de Belgique, ser. 2, vol. 6, No. 1, p. 6, Pl. 1, fig. 1—8. (This important work appears to have been overlooked by all subsequent writers; I find no mention of it in any of the later works on Tanaidacea) Nierstrasz, Siboga-Isop. pt. 1, 1913, p. 24, 25 (*ubi lit.*).

I may here point out that Nierstrasz, in his work above quoted on the Isopoda of the Siboga-Expedition (pl. 1, Isopoda chelifera) gives a complete list of all the Tanaidacea hitherto known, with full bibliographical references. Stebbing has since described a species (*Tanais Ohlini*) in Proc. Zool. Soc. London, 1914, p. 349, Pl. 1.

Fam. APSEUDIDÆ.

Genus APSEUDES.

APSEUDES GRACILOIDES n. sp. (Fig. 15).

St. 126. *42°43′ N, 9°50′ E*, 10-7-1910, 600—620 m. 10^{10}pm. 25 m. w. 3 spec.

St. 132. *38°57′ N, 9°47′ E*, 10-7-1910, 1227 m. Sifted bottom material, parts of 2 spec.

St. 140. *37°29′ N, 12°34′ E*, 20-7-1910, 112 m. Dredge. 1½ spec.

Fig. 15. Apseudes graciloides.

At the stations mentioned, some more or less defective specimens were taken, belonging to a species of *Apseudes* very closely related to *A. gracilis* Norman and Stebbing (Transact. Zool. Soc. London, vol. 12, pl. 4, 1886, p. 95—97, Pl. 20; — H. J. Hansen, Malacostraca 2, Tanaid.; Danish Ingolf Expedition, vol. 3, pt. 3, 1913, p. 13—15, Pl. 1, fig. 3). None of these specimens is complete, but as all appear to be ♂, the parts missing in one could be supplied by the others.

Seen dorsally, the species is of comparatively slender build, strongly resembling in outline the figure of *A. gracilis* given by Norman and Stebbing; the anterior lateral processes, however, are lacking on the second free segment of the body. (What looks like the anterior lateral process on 1. segment of the body is in reality 1. joint of p. 2). The posterior lateral processes, however, on all free segments of the body, are distinctly curvated, and all segments have a long spiniform process on the ventral side. The five first caudal segments have a spine on the ventral side, as in *A. gracilis*. Ant. 1 is somewhat shorter in proportion than that of *A. gracilis*; the long flagellum is only as long as the

stem, and contains about 18 joints. The short flagellum, on the other hand, is long in proportion, being about ¾ the length of the long one, and containing about 9 joints. Ant. 2 is somewhat longer than the stem of ant. 1.; the flagellum has 9 joints. The oral parts resemble in essentials the figures of these appendages as shown by Sars in his Account (vol. 2, Pl. 1) for *A. spinosus*. There is a large spine on the labrum: I have not, however, been able to find, in the specimen dissected, the curvated spines which link the two maxillipeds together. As will be seen from my drawings, p. 1 — p. 2 exhibit a striking similarity to the corresponding appendages in *A. gracilis*; the only essential difference appears to be that in these two pairs of appendages, the lower side of the second joint is smooth in *A. gracilis*, whereas in the case of *A. graciloides*, it is furnished with 2 (p. 1) or 3 (p. 2) small but strong articulated spines. P. 3 — p. 6 differ from the corresponding appendages of *A. gracilis* only, as far as regards essentials, in the shorter outermost joint; this would seem, however, to be due the defective condition of my specimens. Pleopoda are entirely lacking in all my present specimens. The uropoda have a comparatively short, thick stem; in the specimen drawn, one uropod has a small exopodite, which appears to consist of two joints, the outermost being twice the length of the proximal. Possibly there may in reality be 3 joints; the articulation however, is very indistinct. The exopodite is lacking in all the specimens.

All the specimens appear to be ♂♂. Those in the best state of preservation are 10 mm long; some of the fragments must, however, have belonged to individuals measuring at least 12 mm. The colour (in alcohol) is white.

Remarks. As will be seen from the foregoing, in conjunction with my figures, this species is thus very closely related to *A. gracilis*, but is easily distinguished from this by means of the curvated posterior lateral processes on the free segments of the body, and by the spines on the lower edge of the second joint in p. 1— p. 2.

APSEUDES ECHINATUS G. O. Sars.

Apseudes echinatus G. O. Sars, Revision of Gruppen Isopoda chelifera; Archiv f. Math. og Naturvid., vol. 7, 1880 (1881), p. 13.

* — — G. O. Sars, Middelhavets Saxisopoder; *ibid.* 1886, p. 286, Pl. 4.

— *lunarifrons* Norman & Stebbing, Isop. "Lightning" etc.; Transact. Zool. Soc. London, vol. 12, pt. 4, 1886, p. 89, p. 134, Pl. 17, fig. 2.

Apseudes echinatus Nierstrasz, Siboga-Isop., pt. 1, 1913, p. 11.

St. 140. *37°29′ N, 12°34′ E*, 20-7-1910. 112 m. Dredge. 1 ♂.
St. 213. *40°14′ N, 6°54′ E.* 31-8-1910. 75 m. Dredge. 2 ♂♂.

Sars' and Norman & Stebbing's species are synonyms. Norman and Stebbing (l. c. p. 89) quote Sars' species with a? as a synonym; in a note p. 134, however, after conclusion of the work, they write that they have "this day" received Sars' publication above referred to on the Tanaidacea of the Mediterranean, that there is only one species, and that the species named by them should thus be cancelled.

Also found: Gulf of Spezia, off Porto Venere, in 20—30 fath. (Sars l. c. 1886) Mediterranean, off the coast of Algeria, 51—510 fathoms (Norm. & Stebb.)

APSEUDES GROSSIMANUS Norm. & Stebbing.

**Apseudes grossimanus* Norman & Stebbing, Isop. "Lightning"; Transact. Zool. Soc. London, vol. 12, pt. 4, 1886, p. 93, Pl. 19.

— — Nierstrasz, Isop. Siboga, pt. 1, 1913, p. 10, 11, 12 (*ubi lit.*)

St. 126. *42°43′ N, 9°50′ E.* 600—620 m. 10-7-1910. 10^{10} pm. 25 m. w. 8 spec. (young ♂?).
St. 139. *37°57′ N, 11°54′ E.* 680 m. 20-7-1910. Dredge. 3 ♂.

Of the specimens from St. 126, 7 are 5 mm, the 8th, however 10 mm long. All, including the largest, have chelae of exactly the same shape as shown by Norm. & Stebb. for ♀; all the spines on the carapace are slightly longer than indicated in Norm. & Stebbing's figures. The 3 specimens from St. 139 are of about the same size as the largest one from St. 126, and exactly resemble this. All the specimens appear to be ♂.

Also found: Portugal 240 fath. *30°39′ N, 9°39′ W; 52°25′ N, 11°40′ W* (S. W. of Ireland) 90 fath.; Mediterranean; Sidi-Teni, N.Africa; S.Africa 225—448 m. (Nierstrasz l. c.).

APSEUDES RETUSIFRONS Richardson.

**Apseudes obtusifrons* Norman & Stebbing, Isop. "Lightning" etc.; Transact. Zool. Soc. London, vol. 12, pt. 4, 1886, p. 88, Pl. 18, fig. II.

— *retusifrons* Richardson, Proc. U. S. Nat. Mus. vol. 42, 1912, p. 584 note.

St. 126. *42°43′ N, 9°50′ E.* 600—620 m. 10-7-1910. 10^{10} pm. 25 m. w. 4 ♀♀, 1 ♂.

Chela, strange to say, equally strong in ♂ and ♀.

Also found: W. of Gibraltar *35°50′ N, 5°26′ W*, 128 fath., 540 fath. (Norm. & Stebb.) — This species has thus not previously been taken in the Mediterranean.

Fam. TANAIDÆ.

Genus TANAIS.

TANAIS ROBUSTUS Moore.

**Tanais robustus* Moore, Proc. Acad. Nat. Sci. Philadelphia 1894, p. 90—94, Pl. 5.
Richardson, Bull. U. S. Nat. Mus., vol. 54, 1905, p. 11, fig. 15 (copy of Moore's description).
— *testudinicola* Dollfus, Mém. Soc. Zool. France, vol. 11, 1897, p. 37, with figs.

St. 132. *38°57′ N, 9°47′ E.* 14-7-1910.

Found between filiform green algæ on the back of two sea turtles taken at the surface. Abt. 10 spec. The specimens are 1—4 mm long, and agree entirely with the description given by Moore. The colour (in spirits) is a violet brown (Moore: pale yellow) with very pale chelæ.

This species has hitherto only been found on turtles (*Thalassochelys caretta*); the occurrence of the specimens from the "Thor" however, does not quite agree with Moore's statement to the effect that they inhabit "minute tubes in the crevices between the scales of the turtle's (*Thalassochelys caretta's*) carapace".

Also found: New Jersey (Moore). Mediterranean, between the Balearic Islands and Algiers: *37°55′ N, 0°40′ E* and *37°26′ N, 0°50′ E* (Dollfus).

CUMACEA.

Fam. VAUNTHOMPSONIIDÆ.

Genus BATHYCUMA.

? BATHYCUMA LONGICAUDATUM Calman.

**Bathycuma* (?) *longicaudata* Calman, Proc, U. S. Nat. Mus. vol. 41, 1912, p. 604, p. 614, fig. 10—13.
— *longicaudatum* Stebbing, Cumac.; Das Tierreich 1913, p. 12.

St. 132. *38°57′ N, 9°41′ E.* 1227 m. 10-7-1910. Sifted bottom material; 1 ♀, abt. 9 mm.

The determination is not absolutely certain, as the specimen was somewhat defective, and could not well be dissected. As far as can be seen, however, it agrees well with Calman's description, save for the fact that the teeth on the dorsal side of the carapace reach almost to its posterior edge.

Also found: "Albatross" St. 4382, off San Diego, California 642—666 fathoms (Calman l. c.).

Fam. BODOTRIIDÆ.

Genus CYCLASPIS.

CYCLASPIS LONGICAUDATA G. O. Sars.

Cyclaspis longicaudata G. O. Sars, Vid. Selsk. Forh. Christiania, 1864 (1865), p.207.
— G. O. Sars, Account vol. 3, 1900, p. 16, Pl. 7—8.
Stebbing, Cumac.; Das Tierreich, 1913, p. 30 (*ubi lit.*).

St. 132. *38°57′ N, 9°47′ E.* 10-7-1910. 1227 m. Sifted bottom material, 6 spec.

Also found: From N. W. and N. E. Atlantic (N. Norway) to Mediterranean; 120—3285 m. (Stebbing l. c.).

Fam. PLATYSYMPODIDÆ.

Genus PLATYSYMPUS Stebbing — PLATYASPIS G. O. Sars.

PLATYSYMPUS TYPICUS G. O. Sars.

Platyaspis typica G. O. Sars, Vid. Selsk. Forh. Christiania 1869 (1870), p. 158.
* — — G. O. Sars, Account vol. 3, 1900, p. 27, Pl. 19—20.
Platysympus typicus Stebbing, Cumac.; Das Tierreich 1913, p. 61 (*ubi lit. et syn.*).

St. 132. *38°57′ N, 9°47′ E.* 10-7-1910. 1227 m. Sifted bottom material, 1 spec.

Also found: Norway, northward as far as Lofoten, 226—753 m.; W. of Ireland, 364—728 m.; Capri 750—110 m. (Stebbing l. c.).

Fam. DIASTYLIDÆ.

Genus DIASTYLIS.

DIASTYLIS PROCESSIFERA n. sp. (Fig. 16).

St. 139. *37°57′ N, 11°54′ E.* Abt. 600 m. (?). Dredge. 1 spec.

At this station, a specimen (immature ♀) was taken by the "Thor" of a Cumacean, the determination of which has proved a matter of considerable difficulty. Despite the fact that it differs in certain respects, which will be referred to later on, there can be no doubt that it belongs to the genus *Diastylis*, taken in

Fig. 16. Diastylis processifera ♀.
The figure below P. 1. presents the sculpture of the surface. Ant. 1 is by a misprint called Ant. 2, and vice versa.

the extent assigned by Stebbing, in Cumac. ("Das Tierreich") to this genus.

Unfortunately the specimen is not fully grown, and is moreover, not in a very good state of preservation. I have therefore only been able to dissect to a slight extent; the figures given however, indicate all that I have been able to observe in the course of such dissection as it was possible to make.

In point of habit, the animal greatly resembles *G. cornuta* Boeck (Sars, Account, vol. 3, p. 45, Pl. 35—36; Stebbing, Cumac. Tierreich p. 96 [*ubi lit.*]) differing, however in various ways.

The whole of the surface exhibits a very finely reticulated sculpture, with a small bud-like protuberance in the centre of each mesh; an idea of this may be obtained from the detail as shown. The carapace is armed with but 3 pairs of spines, lacking all those smaller ones which are found in *G. cornuta*. The 3. pedigerous segment has two spines dorsally, the 5. segment 3. This last named segment (5) is drawn out to a point on either side. I am unable to say whether eyes are present or no. The telson is about the same length as the two adjacent caudal segments together; with apical spines included, it corresponds in length to the stem of the uropoda and has, in addition to the apical spines, also five spines on the right and seven on the left. The broad part and the narrower portion are as nearly as possible of equal length. Ant. 1 lacks the accessory flagellum; this feature, however, should scarcely be considered as of especial importance, having in mind the fact that the specimen is not very well preserved (the distal half of one of the antennæ is wanting entirely); a far more important feature of ant. 1. is, in my opinion, the fact that the proximal portion of 1. joint extends in a long process on the outer side (× in the figure denotes the point at which the antenna was fixed). The pereiopoda resemble those of *D. cornuta*; the slight dissimilarities may be seen from the figure. The stem of the uropoda is about the same length as the telson + apical spines; the endopodite is, with its terminal spine, about equal in length to the exopodite without terminal spines, and about half as long as the stem.

Length 9 mm. Colour white. Shell hard, calcareous, brittle.

The specimen is a ♀, but is not fully grown, lacking the marsupion.

Remarks. As will be seen from the foregoing,

the species is closely related to *D. cornuta*, differing, however, at the first glance by its less pronounced spinous armour, and longer telson. (In *D. cornuta*, the telson is somewhat shorter than the stem of the uropoda). These characters may however, possibly be regarded as peculiar to the younger forms. Far more important is the large process on the first joint of ant. 1, and I cannot but consider this as ample evidence of the fact that we have here to deal with a new species. I therefore suggest that in view of the feature in question the specific name *processifera* be adopted.

DIASTYLIS STEBBINGI n. sp.

(Fig. 17).

St. 228. *36°02′ N, 5°06′ W.* > 800 m. 1600 m. w. 7-9-1910. 1 spec.

At this station, an immature ♂ of the genus *Diastylis* was taken by the "Thor". As will be seen from the figures, the arrangement of spines on the carapace greatly resembles that of *D. capreensis* Calman. (Mitt. Zool. Stat. Neapel, vol. 7, 1906, p. 429, Pl. 28, fig. 44—45; this species has, strangely enough, been overlooked by Stebbing in his Cumacea in Das Tierreich). The present species is not, however, identical with Calman's; as will be seen from the following, the two forms differ in certain respects (e. g. the telson) where dissimilarity cannot be attributed merely to the difference in sex (my specimen is ♂, Calman's ♀) or size (12.5 and 5.2 mm respectively).

The spines of the carapace will be seen from fig. 17. The ocular lobe is somewhat longer than it is broad, and apparently furnished with two colourless eyes. The free segments of the body are glabrous dorsally, save for two quite small spines on segm. 2, and three slightly smaller on segm. 5. The groove between 3. and 4. segments is not so deep as those between the others; these two segments are possibly fused, but I have not been able to satisfy myself with certainty as to this. The epimeral portion of the 5. segment tapers to a point. The four anterior caudal segments have each a couple of spines dorsally; segm. 1 has in addition a thick spine on either side above the pleopod, and a larger spine centrally situate on the ventral side. The telson is approximately equal in length to the two adjacent caudal segments together; the præ- and postanal portions are of nearly equal length. There are

Fig. 17. Diastylis Stebbingi.

6 spines on either side; the apical spines have been entirely broken off.

1. pair of antennæ is of the usual shape; 2. pair lie curved up like a hook under the carapace, in the manner shown by Sars (Account, vol. 3, Pl. 42) for the young ♂ of *D. spinulosa*. With regard to 3. pair of maxillipeds and the 5 pairs of pereiopoda there is nothing particular to be said, save that p. 3 — p. 5 on the 2. joint in the distal end have a spine on the anterior side: the same feature is noticeable on p. 3 in Calman's figure of *D. capreensis*. On the exopodite of p. 3 — p. 4, the natatory setæ are not yet developed, but resemble small, soft spines. The two pairs of pleopoda are of the customary young-stage form. The stem of the uropoda is exactly the same length as the telson without apical spines; the branches are half as long as the stem. The arrangement of spines will be seen from my figures.

Length 12.5 mm.

Remarks. Despite the fact that the individual is not mature, it would seem impossible to refer it to any of the known species: I have named it after the Rev. T. R. R. Stebbing, to whom I am greatly in-

debted for having procured for me works which I should otherwise have been unable to obtain.

Genus ADIASTYLIS.

ADIASTYLIS LONGIPES G. O. Sars.

Diastylis longipes G. O. Sars, Öfvers. Kgl. Svenska Vet. Akad. Förhandl., vol. 28, pt. 1, 1871, p. 74.

* — — G. O. Sars, Sv. Vet. Akad. Handl., n. ser., vol. 9, No. 13, 1871, p. 32, Pl. 13, fig. 65—69.

* — — Bonnier, Ann. Univ. Lyon, vol. 26, 1896, p. 550, Pl. 29, fig. 4.

Adiastylis — Stebbing, Cumac.; Das Tierreich 1913, p. 116 (*ubi lit. et syn.*).

St. 132. *38°57′ N, 9°47′ E.* 10-7-1910. 1227 m. Sifted bottom material. 1 spec.

Also found: *60°45′ N, 4°49′ W,* 933 m.; *53°41′ N, 7°34′ W,* 838 m; *38°7′ N, 9°18′ W,* 1036 m; *44°17′ N, 4°38′ W,* 950 m. (Stebbing l. c.). The species is thus new for the Mediterranean.

Genus MAKROKYLINDRUS.

MAKROKYLINDRUS JOSEPHINÆ G. O. Sars.

Diastylis Josephinæ G. O. Sars, Öfvers. Kgl. Svenska Vet. Akad. Förhandl., vol. 28, pt. 1, 1871, p. 77.

* — — G. O. Sars, Svenska Vet. Akad. Handl., n. ser., vol. 9, No. 13, 1871, p. 36, Pl. 15, fig. 72—74.

Makrokylindrus Josephinæ Stebbing, Cumac.; Tierreich 1913, p. 120 (*ubi lit. et syn.*)

St. 93. *49°25′ N, 12°20′ W.* 1270—1180 m. 25-6-1905. 2 spec.

Also found: Off Portugal, *38°10′ 30″ N, 9°25′ W,* 1425 m. N. of Færø Islands, *48°50′—67°07′ N, 3°6′—11°9′ W,* 629—1426 m; off W. of Ireland, 364—699 m. (Stebbing l. c.).

Fam. PROCAMPYLASPIDIDÆ.

Genus PROCAMPYLASPIS.

PROCAMPYLASPIS ARMATA Bonnier.

**Procampylaspis armata* + *P. echinata* Bonnier, Edriophthalmes du "Caudan"; Ann. Univ. Lyon, vol. 26, 1896, p. 541, p. 544, Pl. 29, fig. 1—2.

* — *armata* Calman, Mitt. Zool. Stat. Neapel, vol. 17, 1906, p. 419, Pl. 27, fig. 13—20.

— Stebbing, Cumac.; Tierreich 1913 p. 186 (*ubi lit.*).

St. 132. *38°57′ N, 9°41′ E.* 1227 m. 10-7-1910. Sifted bottom material. 1 spec., immature ♀.

Also found: *44°17′ N, 4°38′ W,* 950 m (Bonnier); Irish Sea, 50 miles W. N. W. of Cleggan Head, 212 m, and 77 miles W. N. W. of Achill Head, county Mayo, 699 m (Calman, Cumac. Ireland 1905); Capri 200—1100 m (Calman l. c. 1906).

Fam. CAMPYLASPIDIDÆ.

Genus CAMPYLASPIS.

CAMPYLASPIS VITREA Calman. (Fig. 18).

**Campylaspis vitrea* Calman, Mitt. Zool. Stat. Neapel, vol. 17, 1906, p. 425, Pl. 28, fig. 28—34.

— — Calman, Proc. U. S. Nat. Mus., vol. 41, 1912, p. 628.

— Stebbing, Cumac.; Tierreich 1913, p. 193.

St. 132. *38°57′ N, 9°47′ E.* 1227 m. 10-7-1910. Sifted bottom material. 1 spec. immature ♀, 4.5 mm.

There can be no doubt as to the fact that this specimen really belongs to Calman's species. It agrees entirely with Calman's description and figures (l. c. 1906), save that the median posterior connecting ridge between the transverse ridges crossing the posterodorsal part of the carapace is not less distinct than the other ridges, as pointed out by Calman in a note (3) l. c. 1912. The same writer's remarks (l. c. 1912) as to difference between specimens from the Mediterranean and those from eastern America do not, however, appear to fit in with the features as found in the specimen from the "Thor". Still, the value of such relative characters, as quoted by Calman l. c. 1912 in notes 1—4 and 6 cannot of course be properly estimated unless by actual comparison with his specimens.

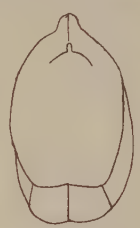

Fig. 18. Campylaspis vitrea.

Also found: Puritan Exp. St. 18, 26, 39 (Capri), 950—1100 m (Calman 1906), *40°02′ N, 68°50′30″ W,* 547 fath., 29° F. (Calman 1912).

CAMPYLASPIS HORRIDOIDES n. sp. (Fig. 19).

St. 132. *38°57′ N, 9°47′ E.* 1227 m. 10-7-1910. Sifted bottom material.

At this station, 8 specimens were taken by the "Thor" (4 ♂, 4 ♀) belonging to a *Campylaspis* species closely related to *C. horrida* G. O. Sars (Sars, Account vol. 3, 1900, p. 89, Pl. 62; Stebbing, Cumacea, Tierreich 1913, p. 196).

♂ General form of the body similar to that of *C. horrida*; the carapace here, however, in contrast to what is generally found to be the case with the genus *Campylaspis*, being equally broad in the anterior and posterior portions. The ocular lobe is small, with no

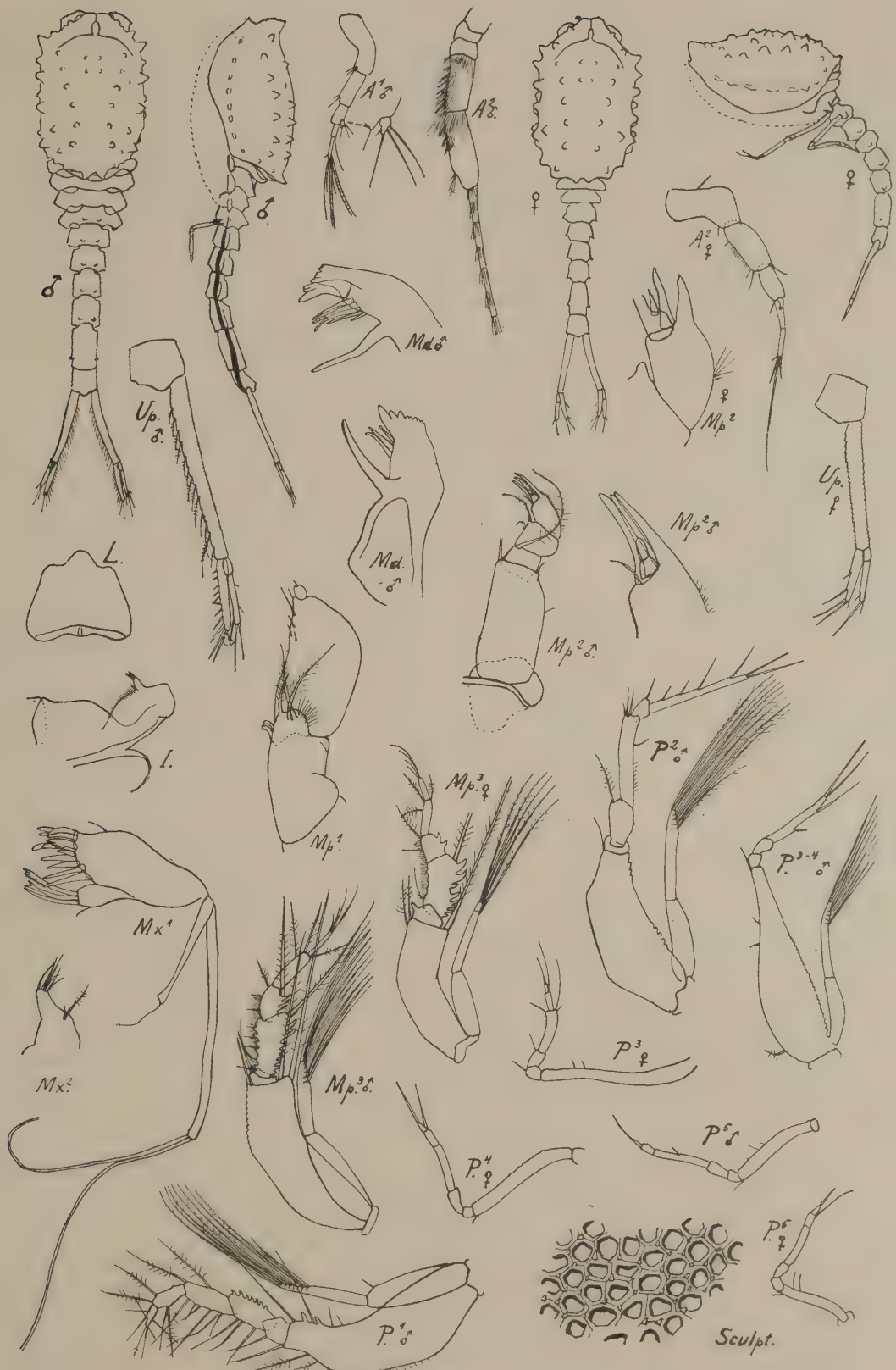

Fig. 19. Campylaspis horridoides.

apparent trace of eyes. The carapace is armed with conical spines or protuberances arranged roughly in six longitudinal rows: two down the back, one on either side, where the back, which is more or less flat, curves down towards the sides of the animal, and one again on either side slightly above and nearly parallel with the under side of the carapace. Medially situate on the posterior edge of the carapace are two fairly large protuberances. The whole surface exhibits, moreover, a raised, reticulated pattern with more or less regular hexagonal or octagonal mesh. At every corner, where two meshes meet, there is a small spine. The two anterior pedigerous segments are, as usual, elevated to thin lamellæ; the lateral portion of all free segments of the body, especially the anterior ones, extends far out to the side, and is hatchet-shaped at the point. The 5. (and possibly also 3.—4.) segment of the body has two small protuberances dorsally, as have also 1—4 caudal segments: in the 5. caudal segment they are placed far down on the side. The uropoda are somewhat longer than the 4 last caudal segments; the stem is about 2½ times as long as the branches, and, as usual, furnished on the inner side with ciliated setæ. The endopodite is as usual, slightly longer than the exopodite, and armed with about 11 spines.

I have figures of all appendices, and everything can thus be seen from these; in the following remarks I mention only such points as appear to me of especial importance. In the ♂ dissected, mp. 2 exhibits, in the outermost joint, a slight deviation from what according to Sars' figures in the Account appears to be the rule. We find, for instance, in the fig. of mp. 2 in *C. rubicunda* (Sars, Account vol. 3, Pl. 57) that the small outermost joint has 4 spines, while the penultimate has at the point a single large articulated spine. In the ♂ which I have dissected, however, the outermost joint has only a single small spine, the penultimate having at the point two large articulated and one large inarticulate spine. Having had but 4 specimens of either sex at my disposal, I have only dissected one of each, and am therefore unable to say whether the feature inquestion is or is not an accidental peculiarity in the dissected specimen. In the ♀ dissected, these characters are, as my figures show, but little different from what was found in the ♂. Mp. 3 differs from that of *C. horrida* mainly by the strong spines on the edges of 4. joint. The pereiopoda agree on the whole with Sars' figures of *C. horrida*. The exopodites have abt. 10 natatory setæ (in the ♀ only 6).

Length 6 mm. Colour (in alcohol) white.

♀ (immature) differs on the whole from ♂ only in such features as mark the usual sexual difference common to the genus. I have not been able to completely dissect ant. 2, and cannot therefore give any illustration of this. The caudal segments have no dorsal protuberances, but some small ones on the sides. The spines on the edge of 4. joint of mp. 3 differ a little from those of the ♂. The four ♀ are immature, lacking the incubatory plates.

Length 5 mm.

Remarks. The specimens here dealt with strongly resemble *C. horrida*, differing, however, in the following points: 1) the carapace is equally broad in the anterior and posterior portions 2) two spines on the posterior margin of the carapace 3) 4. joint of mp. 3. I therefore take it for granted that this is really a new species, which I have named, on account of its great resemblance to the species referred to, *C. horridoides*.

Calman mentions (Proc. U. S. Nat. Mus., vol. 41, 1912, p. 627) a Japanese specimen, which he somewhat doubtfully refers to *C. horrida*. It differs from Sars' figures in the following points: "tubercles on the carapace are slightly smaller and more acutely conical, and they show less tendency to run together in continuous ridges. The distal segments of the third maxillipeds and first and second legs are noticeably more slender than in Sars' figures". The peculiarity which Calman notes in the spines on the carapace may with some justification be taken as similarly applying to the specimens from the "Thor": the second distinguishing feature is less applicable, but the distal segment of p. 2 is, as a matter of fact, somewhat more slender in the specimen from the "Thor" than in Sars' figure af *C. horrida*. It is therefore not impossible that Calman's specimen belongs to *C. horridoides*.

AMPHIPODA

1. Gammaridea.

Fam. LYSIANASSIDÆ.

Genus TRICHIZOSTOMA.

TRISCHIZOSTOMA NICÆENSE A. Costa

Trischizostoma nicæense Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 13 (*partim*).

* — — E. W. Sexton, On the Amphipod genus Trisch.; Proc. Zool. Soc. London, 1908, p. 375 (*ubi lit.*), Pl. 14—16, Pl. 17 fig. 1—12, Pl. 19, fig. 1, Pl. 21, fig. 14.

— — Stebbing, Ann. South African Mus., vol. 6, 1908, p. 60.

St. 36. *44°21′ N, 2°37′ W.* 10-5-1906. 1125—1050 m. 1250 m. w. 1 spec.
St. 30. *59°17′ N, 7°29′ W.* 30-5-1905. 895 m. 1000 m. w. 1 spec.
St. 46. *44°37′ N, 2°17′ W.* 17-5-1906. 1360 m. 300 m. w. 1 spec.
St. 76. *47°08′ N, 5°48′ W.* 10-3-1909. 1800 m. 1600 m. w. 2^{40} pm. 5 spec.
St. 90. *47°47′ N, 8°00′ W.* 21 (22)—6-1905. 740—1600 m. 300 m. w. 2 spec.

All specimens belong to the species *T. nicæense*, and not to *T. Raschii* Boeck, which has previously been considered as identical with the former.

Also found: Mediterranean, near Naples (Della Valle; Gamm. Golf. Neapel 1893). *46°15′ N, 7°09′ W.* 0—3000 m. (Chevreux, Bull. Mus. Océanogr. Monaco No. 35, 1905, p. 7). W. and S. W. of Ireland (Sexton, l. c. 1908).

Genus LYSIANASSA.

LYSIANASSA CERATINA Walker

Lysianassa ceratinus Walker, Proc. Liverpool Biol. Soc., vol. 3, 1889, p. 200, Pl. 10, fig. 1—8.

— *longicornis* Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 39 (*partim*).

* — *ceratina* Walker, Transact. Linn. Soc. London, ser. 2, Zool., vol. 12, 1909, p. 327 (*ubi lit.*).

* — — Chevreux, Mém. Soc. Zool. France, vol. 23, 1910 (1911), p. 158, Pl. 6, fig. 10.

St. 17. *37°49′ N, 23°27′ E.* 30-12-1908. 55 m. 3 spec.
St. 41. *39°10′ N, 9°35′ E.* 2-2-1909. Ca. 1 m. 2 spec.
St. 105. *37°49′ N, 2°08′ W.* 24-6-1910. 20 m. 2 spec.

With regard to the former confusion of this species with *L. longicornis* Lucas, special reference may be made to Walker (l. c. 1909) who gives the following characters as most important.

	L. longicornis	*L. ceratina*
eyes	red	dark brown or black
flagella of antennæ	red	colourless
telson	apically rounded (Chevreux l. c. 1910, Pl. 6, fig. 9).	truncate with the angles more or less rounded (Chevreux l. c. 1910 Pl. 6, fig. 10).

Also found: Coasts of Europe from Great Britain and up in the Mediterranean; Canaria, Senegal, Suakim Harbour (Red Sea), Wasin (Brit. E. Africa) Ceylon (Walker l. c. 1909; Chevreux l. c. 1910).

Genus ARISTIAS.

ARISTIAS NEGLECTUS H. J. Hansen

Aristias neglectus H. J. Hansen, Vid. Meddel. Naturh. Foren. Kbhvn. 1887 (1888), p. 67.

* — *audouinianus* G. O. Sars, Account vol. 1, 1895, p. 48, Pl. 17, fig. 2.

— *neglectus* Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 50 (*ubi lit. et syn.*).

St. 142. *35°44′ N, 15°07′ E.* 22-7-1910. 98 m. 1 spec.

Distribution. Arctic Ocean, North Atlantic, North Sea, Skagerak and Kattegat (S.- and W. Scandinavia, Shetland Islands); Mediterranean (Stebbing, Tierreich).

Genus ICHNOPUS.

ICHNOPUS SPINICORNIS Boeck

Ichnopus spinicornis Boeck, Forh. 8de Skandinav. Naturforsker-Møde 1861, p. 645

* — — G. O. Sars, Account vol. 1, 1895, p. 40, Pl. 15.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 52 (*ubi lit. et syn.*).

St. 14. *41°24′ N, 17°45′ E.* 21-12-1908. 1125 m. 5^{20} am. 65 m. w. 1 spec.
St. 18. *37°51′ N, 23°14′ E.* 30-12-1908. 220 m. At the bottom. 2 spec.
300 m. w. 4 spec.

St. 62. *35°45′ N, 5°59′ W.* 22-2-1909. 58 m. 9^{10} pm. 25 m. w. 12 spec.
8^{25} pm. 100 m. w. 4 spec.
St. 63. *35°50′ N, 6°03′ W.* 22-2-1909. 490 m. 0^{05} am. 25 m. w. 1 spec.
St. 135. *37°17′ N, 10°28′ E.* 16-7-1910. 200 m. 0^{55} am. 25 m. w. 1 spec.

Distribution. Arctic Ocean, North Atlantic and North-Sea (West-Norway); Mediterranean; Java Sea (3° S, 107° E) (Stebbing l. c.).

Genus HIPPOMEDON.

HIPPOMEDON TUNISIACUS n. sp. (Fig. 20).

St. 137. *37°17′ N, 10°56′ E.* 17-7-1910. 190 m. At the bottom. 1 ♀.

♀. Body glabrous, compressed; the back evenly vaulted. Cephalon a little shorter than the two first segments of the mesosome combined; lateral corners acute. No traces of eyes. Ant. 1 has the same form as in *H. Holboellii*, but the accessory flagellum has but 3 joints, of which the first one is twice as long as the 2 next combined. In the flagellum the 1st joint is half as long as the remaining 11 joints combined and has a long spine. Ant. 2 is about 3½ times longer than ant. 1; flagellum has 40 joints. The oral parts have the same form as in *H. denticulatus*.

The same thing may be said of the coxal plates and p. 1—7; but the 6th joint in p. 2 is a little longer and narrower; the 7th joint seems to end with 2 small teeth. The distal fore corner in the 4th joint in p. 3—4 and the distal hind corner in p. 5 — p. 7 is not prolonged.

The epimeral plates of metasome 1—3 have about the same form as in *H. robustus* (Sars, Account vol. 1, Suppl. Pl. III), but ep. 3 is anteriorly more prolonged than in all the other known species. The form of up. 1—3 may be seen in my figures; in up. 1 the exopodite is a little longer than the endopodite; in up. 2—3 exop. and endop. have about the same length. Telson has the same form as in *H. propinquus* (Sars, Account vol. 1, Pl. 21, fig. 1), but has only 1 pair of dorsal spines; in the left apical corner there are 2 spines, in the right only 1.

Remarks. Sars says (Account vol. 1, p. 56) that in this genus the eyes disappear as a rule completely in alcohol.

Even supposing, however, that the specimen in question had eyes, it is none the less certain that it represents a new species. I have in the foregoing touched upon its relation to the four species described in Sars' Account; all these have eyes. Two other species also have eyes, viz. *H. bidentatus* Chevreux (Bull. Soc. Zool. France, vol. 28, 1903, p. 87, fig. 4) and *H. serratus* Holmes (Bull. U. S. Bureau Fisheries, vol. 24, 1905, p. 473, text fig., Pl. 4, fig. 2); the present

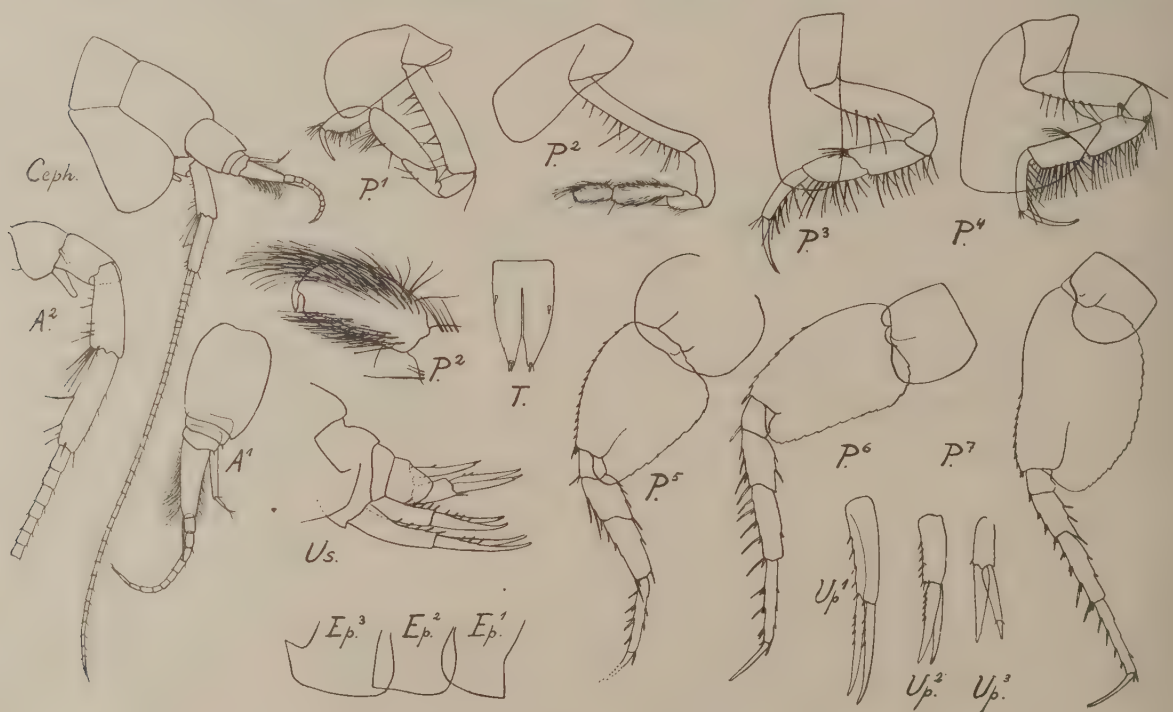

Fig. 20. Hippomedon tunisiacus ♀.

species, however is distinctly and specifically different from these. It differs also from the two known blind species, not only in ep. 3 and telson but also in particular by the following characters: from *H. Geelongi* Stebbing (Challenger Amphip. p. 635, Pl. 11) by the 6th joint in p. 1 (Challenger gn. 1) which in *H. Geel.* is broadest at the distal end, in *H. tun.* broadest in the centre; from *H.* (*Potamon*) *longimanus* Stebbing (Challenger Amphip. p. 643, Pl. 13) by the 6th joint of p. 2 (Challenger gn. 2) which in *H. long.* is as broad as it is long.

The specific designation *tunisiacus* refers to the fact that the species was found off the coast of Tunis.

Genus KATIUS.

KATIUS OBESUS Chevreux

**Katius obesus* Chevreux, Descript. d'un Amphip.; Bull. Mus. Océanogr. Monaco, No. 35, 1905, with figs.

— — K. Stephensen, Conspectus Crust. et Pycnog. Groenlandiæ; Meddel. om Grønland vol. 22, 1913, p. 123 (*lit.*, *distrib.*).

St. 180. *61°34′ N, 19°05′ W.* 10-7-1904. 2160 m. 1800 m. w. 3 spec.
St. 183. *61°30′ N, 17°08′ W.* 11-7-1904. 1800 m. w. 7 spec.
St. 285. *62°49′ N, 18°46′ W.* 1-9-1904. 1 spec.
St. 76. *49°27′ N, 13°33′ W.* 11-6-1906. >2600 m. 2800 m. w. 1 spec.
St. 90. *47°47′ N, 8°00′ W.* 21 (22)-6-1905. 740—1600 m. 300 m. w. 1 spec.

This species is thus, according to the occurrences hitherto recorded (*vide* my publication cited above, where all finds are noted) known from W. Greenland (*64°14′ N*) via W. and S. of Ireland to *36°17′ N, 28°53′ W*, and belongs to the deep Atlantic. The specimen from St. 76 is interesting from the fact of its having bored its way into the remains of a *Salpa*(?), not quite so deeply bored, however, as *Phronima* is found (cf. Remarks on *Chevreuxiella metopoides*, p. 43).

Genus CYPHOCARIS.

CYPHOCARIS ANONYX Boeck

Cyphocaris anonyx Boeck, Amphip. bor. et arct.; Forh. Vid. Selsk. Christiania 1870, p. 104

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 29 (*ubi lit. et syn.*).

— — Chilton, Edinburgh Transact. Royal Soc., vol. 48, pt. 2, 1912, p. 464, figs.

— — K. Stephensen, Conspectus Crust. et Pycnog. Groenlandiæ; Meddel. om Grønland, vol. 22, 1913, p. 111 (distribution).

St. 36. *44°21′ N, 2°37′ W.* 10-5-1906. 1125—1050 m. 1250 m. w. 2 spec.
St. 88. *48°09′ N, 8°30′ W.* 20-6-1905. 600—995 m. 300 m. w. 4 spec.?
St. 179. *47°20′ N, 12°23′ W.* 3-9-1906. 4000 m. 300 m. w. 14 spec.
St. 75. *45°37′ N, 7°03′ W.* 9-3-1909. >4000 m. 1^{45} pm. 4300 m. w. 1 spec.

Distribution. A synopsis of the distribution of this species will be found in my publication quoted above; some additions should, however be made to this. Chevreux, in Bull. Mus. Océanogr. Monaco, No. 35, 1905, p. 7, records some finds in addition to those mentioned by Richard (ibid. No. 41, 1905); these do not, however, represent any extension of the area of distribution. A point of more importance is the fact that Chilton, l. c. 1912, p. 464, records it from "*70°50′ S, 20°30′ W.* vertical net from surface to 1000 fathoms, 1 spec., 20 mm." Not only is the specimen here concerned comparatively large, but the area of distribution is thereby so extended as to embrace the Atlantic Ocean from W.Greenland about *64½° N* to nearly *71° S*. The "Challenger" Expedition also records it from the southern Pacific.

CYPHOCARIS ALICEI Chevreux

**Cyphocaris Alicei* Chevreux, Bull. Mus. Océanogr. Monaco, No. 27, 1905.

— — Walker, Transact. Linn. Soc. London, ser. 2, Zool., vol. 12, 1909, p. 327.

St. 91. *35°53′ N, 7°26′ W.* 18-6-1910. 1225 m. 5^{25} pm. 1600 m. w. 5 spec.

Distribution. *31°06′ N, 24°06′ W*, 0—5000 m; *31°46′ N, 25° W*, 0—3000 m, 5425 m; *32°18′ N, 25°58′ W*, 0—2000 m, 5422 m (Chevreux l. c.). N. W. of Desroches Atoll (Indian Ocean), plankton, 200—300 fms. (Walker l. c.).

CYPHOCARIS RICHARDI Chevreux (Fig. 21—22).

Cyphocaris Richardi Chevreux, Bull. Mus. Océanogr. Monaco, No. 24, 1905.

St. 75. *45°37′ N, 7°03′ W.* 9-3-1909. 4000 m. 1^{45} pm. 4300 m. w. 2 spec. (♂).

Two specimens of this species were taken by the "Thor" at the above station. Both are ♂♂, and of a size remarkable in a *Cyphocaris*, *viz.* 43 and 26 mm. Chevreux' original specimen measures only 12 mm, and the largest *Cyphocaris* hitherto known is the *Cyph. anonyx* mentioned by Chilton (20 mm).

Despite the fact that the two specimens from the "Thor" are so much larger than Chevreux' (12 mm), there is not the slightest doubt as to their belonging to the same species, the dissimilarities being very slight, and only such as would seem attributable to the difference in age. Chevreux' description is very complete, and I will therefore only refer to such fea-

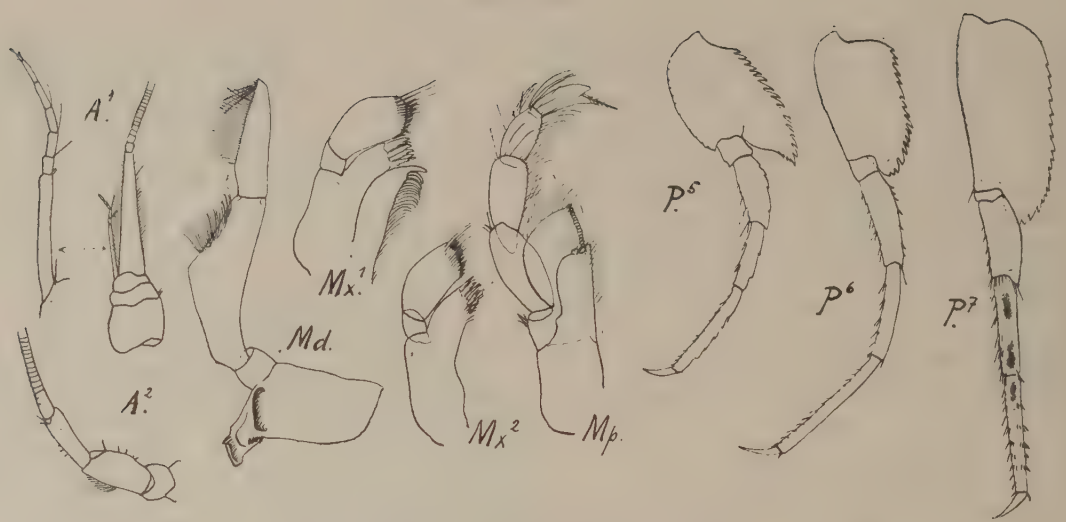

Fig. 21. Cyphocaris Richardi (the little specimen).

tures in which any differences exist. I have also drawn those appendages which are either not given by Chevr. or are not entirely in accordance with his figures. The finer structure of the spines etc. about the oral

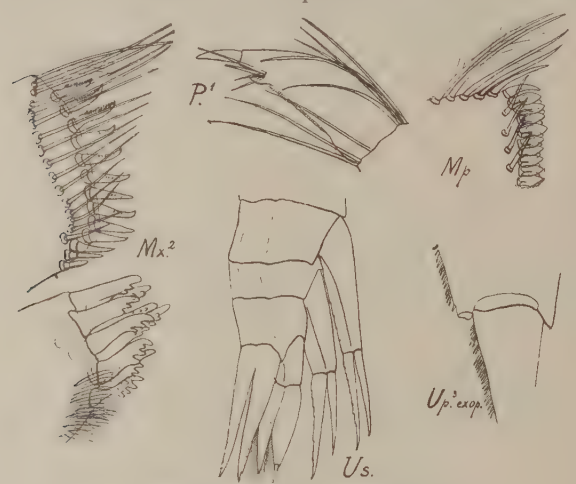

Fig. 22. Cyphocaris Richardi.

parts agrees on the whole with the figures given by Stebbing for these appendages in *C. micronyx* (= *C. anonyx*) in the Challenger Exp. Pl. 16; I have therefore considered it superfluous to go further into this point in the text.

Ant. 1. lacks its point; the same applies to the second pair. The accessory flagellum has 7 joints (Ch. gives 4) and is only half of the length of 1. joint in the flagellum; the distal segment is very small and thin. Despite the fact that 2. pair of antennæ lack their points, they are nevertheless almost as long as the whole animal. The oral parts agree almost entirely with those of *C. anonyx*. P. 1—4 resemble completely the figures given by Ch. P. 5—7 however, I have drawn. The second joint of p. 5 differs slightly from Ch.'s figure. The second joint of p. 6—7 is remarkable as having large and small teeth indiscriminately alternating on the posterior edge, this being particularly noticeable in p. 6. The proximal part of the ultimate joint in p. 7 (not, however, in the other legs) is furnished with a number of quite small teeth, so small indeed, that they do not appear in the figure. The uropoda correspond to Ch.'s description; the peduncle of urop. 2, however, projects so far out as to give a length between that of up. 1 and up. 3. (In Fig. 1, Ch. shows this as shorter in up. 2 than up. 1). Up. 3 has also setæ on the distal outer side of the endopodite, the large terminal spine of which, as well as the distal portion of its inner side, is armed with a row of secondary spines (*vide* fig.). The two halves of the telson are connected by a thinner part, so that they can open wide, as in my figure, or fold in close together, as shown in Ch.'s figure.

Distribution. Chevreux records it from St. 1849, *36°17′ N, 28°53′ W* (Azores), 0—3000 m, depth 3410 m.

Genus METACYPHOCARIS.

METACYPHOCARIS HELGÆ Tattersall

**Metacyphocaris Helgæ* Tattersall, Pelagic Amphip. of the Irish Atlantic Slope; Fisheries, Ireland, Sci. Invest., 1905, pt. 4 (1906), p. 29, Pl. 3 fig. 1, Pl. 4.

— — K. Stephensen, Malacostraca .. "Tjalfe"-Exped.; Vid. Meddel.

Naturh. Foren. Kbhv. vol. 64, 1912 (1913), p. 88.

St. 180. *61°34′ N, 19°35′ W.* 10-7-1904. 2160 m. 1800 m. w. 1 spec.
St. 183. *61°30′ N, 17°08′ W.* 11-7-1904. 1800 m. w. 13 spec.
St. 76. *49°27′ N, 13°33′ W.* >2600 m. 11-6-1906. 2800 m. w. 1 spec.
St. 179. *47°20′ N, 13°20′ W.* 4000 m. 3-9-1906. 1800 m. w. 1 spec.

Distribution. All finds hitherto recorded will be found in the two works quoted above. Tattersall mentions it as having been taken at four localities off W. coast of Ireland; in my Report of the "Tjalfe"Expedition it is mentioned from 3 places near W. Greenland, *60°—64° N.*

Genus CRYBELOCEPHALUS.

CRYBELOCEPHALUS MEGALURUS Tattersall

Crybelocephalus megalurus Tattersall, Pelagic Amphip. of the Irish Atlantic Slope; Fisheries, Ireland, Sci. Invest. 1905, pt. 4 (1906), p. 33, Pl. 3, fig. 2, Pl. 5.

St. 76. *49°27′ N,*[1] *13°33′ W.* >2600 m. 11-6-1906. 2800 m. w. 1 spec.

Also found: 50 miles N. by W. of Eagle Island, Co. Mayo, 1000(?) fath., Petersen trawl at 1150 fath. (Tattersall l. c.). It is perhaps worth while to note that at this place, the only find which I have been able to discover in extant works, the species was found together with *Metacyphocaris Helgæ*, which also applies to the specimen from the "Thor".

Genus THORIELLA (n. gen.).

(see Remarks after *Th. islandica*).

THORIELLA ISLANDICA n. sp. (Fig. 23).

St. 173. *61°30′ N, 17°08′ W.* 1800 m. w. 11-7-1904. 1 spec.

This species must, despite some few dissimilarites (further referred to later on) nevertheless be taken as belonging to *fam. Lysianassidæ*. It is included here on account of its great resemblance to *Chevreuxiella metopoides* (*vide infra*) and though not found in those regions of the sea otherwise dealt with in the present work, presents such features of interest that I have thought best to describe it in this connection.

The specimen is 19 mm long; colour (in alcohol) yellowish.

Cephalon is somewhat shorter than 1. segment of the body, but much deeper. There is no trace of any rostrum. The eyes are comparatively small, but of a deep black, with a small accessory eye beneath each. Despite clarification in xylol, I have been unable to bring out the lower contour of the cephalon distinctly; it is therefore not certain that this is correctly drawn.

The two pairs of antennæ are of equal length, somewhat longer than cephalon + the two first segments of the body. In ant. 1, the first joint of the peduncle differs considerably from the form typical for *Lysianassidæ*; instead of being thickest about the middle, there is a pronounced lateral compression on the upper side; the two next joints are of equal length,

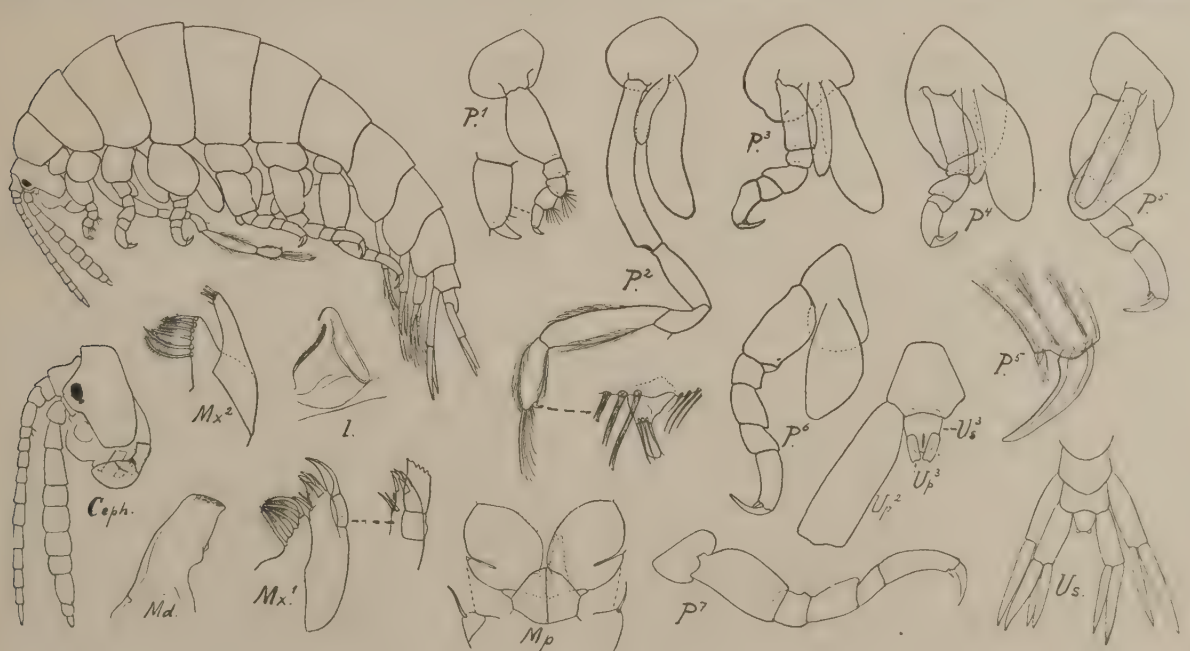

Fig. 23. Thoriella islandica.

and together somewhat shorter than the first. There is no accessory flagellum. The flagellum has 12 joints of almost equal length, the first are, however, slightly shorter than the remainder. Ant. 2 has 12 joints in all, and is of very characteristic form, being spindle shaped, the median joints being almost spherical, but with truncated ends. The epistome, with the anterior lip, is large and prominent, the maxillipeds form a kind of helmet beneath the mouth. The md. has a very faint cutting edge and no palps. Mx. 1. has a biarticulate palp with 6 teeth at the point: it is fairly broad, the outer joint somewhat longer than the inner. In its natural position, as shown in the drawing of the whole mx. 1., the palp forms an angle of 90° with the surface exhibited by the remainder of the mx. and from the position of mx. in the oral cavity, the teeth at the point of the palp make a cutting edge in continuation of that of the md. The exop. is somewhat broader than the endop., and has five strong spines. The endop. has five heavy, partly curved pennate setæ. The exop. of mx. 2 is somewhat narrower than the endop., with 3 spines, (these are unfortunately broken); the endop. has 6 setæ of exactly the same form as those on the endop. of mx. 1. The shape of the posterior lip may be seen from fig. 23.

The maxillipeds are of very peculiar shape, forming, as already mentioned, a kind of helmet about the mouth. The inner plate is large and obtusely triangular, the outer plate acute; the two large plates which form the greater portion of the "helmet" are the palp. This has a deep incision in the outer edge. The section thus divided off by this incision is not connected by articulation with the remainder, so that the palp is single-jointed; on the dexter side however, the very outermost point is articulated, whereas on the sinister this is strangely enough not the case (*vide* fig.).

The pereion consists of the usual 7 segments, the two first somewhat shorter than the remainder. The back is evenly vaulted and fairly broad; in most of the segments, the posterior portion rises somewhat above the adjacent segment. The epimeral plates on the pereiopoda are comparatively small; the posterior corner of the foremost is covered by No. 2; otherwise none of the epimeral plates touch each other, being far smaller than is generally the case with fam. *Lysianassidæ*. The 2. joint of p. 1 curves out on the front side, the leg ending in a simple claw. P. 2 is of the customary form for *Lysianassidæ*, the dactylus is flat, and ends in a broad mucronate spine (*vide* fig. 23) P. 3—7 are almost alike in shape, the hinder ones, however, being longest. They terminate in a strong claw, at the foot of which, and turned inward towards it, 2—3 sharp, knife-shaped spines are placed. The under side of 5—6 joints of p. 5—6 is armed with small, fine spines. Besides the gills on p. 2—6 there is on p. 2—5 a somewhat shorter appendage, shaped like a sausage, which appears to be a marsupial plate. If this be so, then the animal must be a ♀, in which case it must be immature, as the plates are quite undeveloped, and exhibit, in their present state of preservation, exactly the same appearance as the gills.

The shape of the 3 joints of the metasome, and the pleopoda, may be seen from fig.

The urosome consists of the usual 3 segments. The two anterior pairs of uropoda are as nearly as possible of equal length, with long, pointed branches, of which the exop. is somewhat longer and heavier than the endop. Urop. 3, however, consists of but one joint, quite short, and without any branches at all. The telson is entirely lacking.

The specimen in question is a ♀, if the "marsupial plates" have been rightly interpreted.

Remarks on *gen. Thoriella*. This genus, of which the foregoing species is the type, I have named after the ship of the expedition, the "Thor". It belongs indubitably to the fam. *Lysianassidæ*, from the shape of p. 2, differing, however, in the lack of accessory flagellum on ant. 1*), and of mandibular palps; in the shape of the maxillipeds; in the small epimeral plates; the lack of telson, and the rudimentary 3. pair of uropoda. The mucronate spines on sixth joint of p. 3 — p. 7 seem to suggest that the fam. is semiparasitic.

See also remarks on *Chevreuxiella metopoides* (next species).

Genus CHEVREUXIELLA n. gen.

CHEVREUXIELLA METOPOIDES n. sp. (Fig. 24—25).

St. 75. *45°37′ N, 7°03′ W.* 9-3-1909. 4000 m. 1^{45} pm. 4300 m. w. 1 spec. ♂. 24 mm.

The only specimen taken is in many respects so remarkable as to render it very doubtful whether the species can rightfully be considered to belong to the fam. *Lysianassidæ* (*vide infra*: Remarks).

♂. The cephalon is unusually short, scarcely half as long as the first segment of the mesosome, and has

* The accessory flagellum in 1. pair of antennæ is also lacking in *Lepidepecreum longicorne* Bate & Westwood (Stebbing. Amphip. Gamm., Das Tierreich, 1906, p. 80) and in *Crybelocephalus megalurus* Tattersall (Fisheries, Ireland. Sci. Inv. 1905, pl. 4 (1906) p. 33, Pl. 3, fig. 2, Pl. 5). In the following two species it is quite diminutive, consisting only of a single joint: *Metacyphocaris Helgæ*, Tattersall, (l. c. 1906, p. 29, Pl. 3, fig. 1., Pl. 4) and *Paracyphocaris prædator* Chevreux (Bull. Mus. Océanogr. Monaco, No. 32, 1905, p. 2, fig. 2 A).

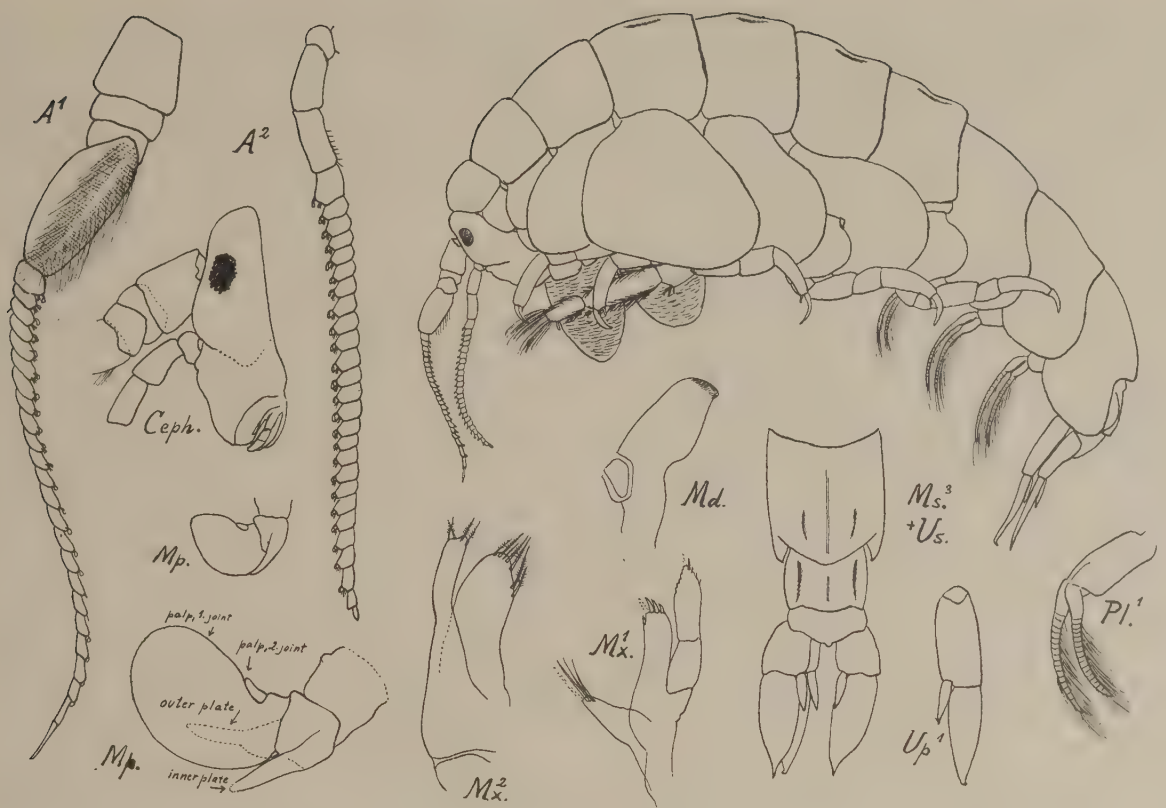

Fig. 24. Chevreuxiella metopoides.

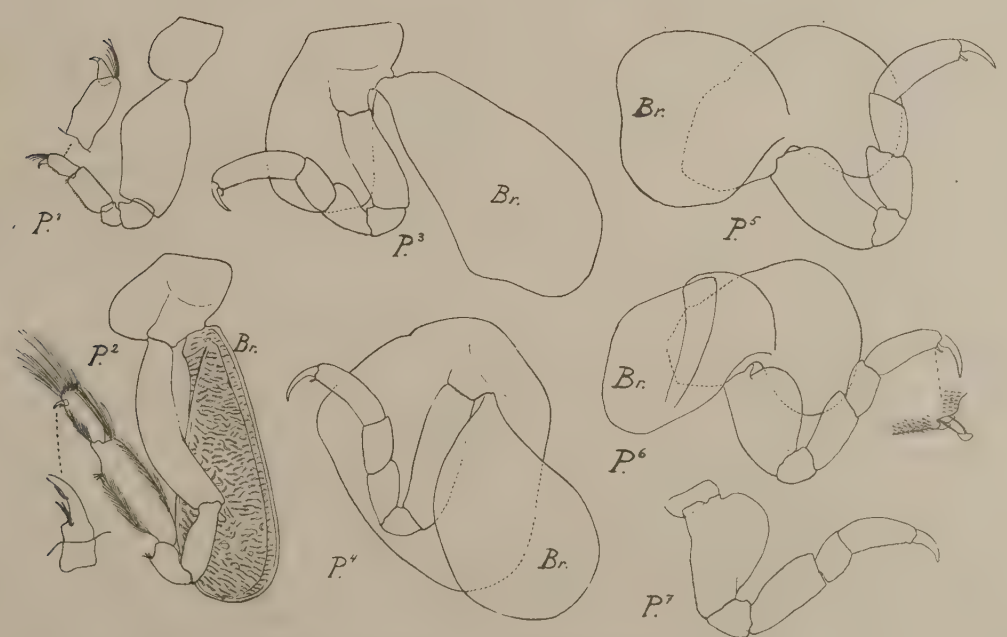

Fig. 25. Chevreuxiella metopoides. The pereiopoda. *Br* : the branchial vesicle.

no trace of any rostrum. It is very deep, however, and despite most careful examination, and clarification with xylol, I have not been able to discover any connecting seam between it and the epistoma. The eyes are oval, and of a deep black. The two pairs of antennæ are almost of equal length, despite the fact that the spec. is a ♂ (in the fam. *Lysianassidæ*, ant. 2 is always longer than ant. 1 in ♂) their length being about that of the cephalon and the 3 first segments of the mesosome together. Ant. 1 is a trifle longer than ant. 2. Of the three joints of the stem, the first is somewhat thicker and a little longer than the two others together. The first joint of the flagellum is an oblong oval, with bristles on the median side and of about the same length as the stem; then follow 24 thinner joints, of which the last is considerably longer than the remainder. All the thin joints of the flagellum with the exception of the two last bear calceoli. There is no accessory flagellum. In ant. 2, the first segment is quite short, the 2. and 3. joints about three times as long. The flagellum has 26 joints, decreasing in thickness towards the point; with the exception of the two last, all have calceoli. The epistoma with the anterior lip is very large, as deep as the front of the cephalon; it is helmet-shaped, with a median sinus running longitudinally. The mandibles are remarkably weak, with very poorly developed and only faintly coloured masticatory parts, with no palp whatever. Mx. 1 has a bi-articulate palp, the outermost joint armed with a few spines at the point; marks remain to show that there have been at least six more spines. The inner branch is shorter and narrower than the exopodite, and has four long spines at the point; only 3 of these, however, are preserved. The exopodite has terminated in 5 short, heavy spines. The two branches of max. 2 are of equal length, the endopodite however, being about 3 times as broad as the exopodite; both have the usual setæ at the point. The lower lip I have been unable to draw, this having apparently been lost during dissection; in any case, I have not been able to find it.

The maxillipeds form, as in the case of *Thoriella islandica* (*vide* previous species) a helmet-like covering about the remaining oral parts, and have thus a form to which I have been unable to find anything corresponding in any Amphipod hitherto described. The long projection is evidently the inner plate; it is more difficult however, to explain the other parts. The large plate with the small appendage must be the palp, which is thus bi-articulate; the inarticulate projection which is visible just inside must then be the outer plate (Fig. 24 naturally shows only the one maxilliped; both outer plate and inner plate are of course paired, as in all Gammaridea).

Nearly all the free segments of body and tail are of equal length measured along the dorsal line: 1. and 2. segments of the body, however, are considerably shorter. The last caudal segments will be referred to later on. The back is evenly vaulted. All segments save the first one have a very faintly marked carina, with a slight longitudinal groove on either side. This is most distinctly seen in 4—7 segments. The first joint of p. 4 is so large as to project both in front and behind; the size of this joint decreases greatly from p. 4 to p. 1. P. 1 is short, its 7. joint terminating in an articulated spine; 2. joint is large and broad. P. 2 has a large foliate gill, as have also the succeeding legs (except p. 7) and are of the usual shape for *Lysianassidæ*. The dactylus is as shown in the fig., armed with 3 spines. P. 3 — p. 4 are alike save for 1. joint, which in p. 4 is not, as is generally the case with *Lysianassidæ*, provided with an incision in the posterior edge so as to accommodate 1. joint of p. 5; instead of this, it projects both forward and backward in a manner similar to that found in the *Stenothoidæ*. In p. 3 — p. 7, the under side of 4.—6. joints is covered with very fine, pointed spines, as shown in the detail figure; the point of the 6. joint in the same pereiopoda (except p. 7) is armed with a pair of sharp, mobile spines, which can be turned inward towards the dactylus. The first joint of p. 5 — p. 6 is very large, nearly as deep as the corresponding joint of p. 4; the second is jointed in to a notch in the fore side. The second joint of p. 6 — p. 7 has a highly convex posterior edge; on p. 7, however, the first joint is greatly reduced. On the ventral side of the animal, between the two pereiopoda of 7. pair, we find a couple of quite small appendages (not shown in the fig.) which appear to be copulatory organs.

The 3. joints of the metasome are of almost equal length, and have, as already mentioned, a very slight carina down the central dorsal line. The epimeral parts are rounded at the posterior end; slightly more oblong, however, on the 3. joint, but without teeth or similar processes on the edge. The pleopoda are of the usual structure.

The urosome consists of only 2 segments, with no telson whatever. The first segment is very slightly carinated along the central dorsal line; the lateral portions, however, rise to a height equal to that of the middle of the dorsum. The second segment is more evenly vaulted, and only half as long. The third segment, with its corresponding pair of uropoda, and telson, are entirely lacking, and as the second segment exhibits a natural posterior termination, the anus also being of perfectly normal form, this cannot be due to accidental mutilation after death. If it be due to accident at all — which does not appear

to be the case, — then the damage must have occurred during life, and the resultant wound entirely healed. Urop. 1—2 are almost alike, projecting almost equally far back, the stem being longer in the first pair than in the second. They are broad and strong, but without any setose covering. The endopodite is scarcely half the length of the exop., and far narrower. The exopodite of urop. 1 terminates in a small hook, turning up towards the back and outwards.

Colour (in alcohol) yellow.

I have named the species *metopoides*, on account of its resemblance to gen. *Metopa*, as regards the large plate on p. 4.

Remarks on gen. *Chevreuxiella*. This new genus I have named after M. Ed.Chevreux, who has published so many valuable works on the Amphipoda from the collections made by the Prince of Monaco in the waters where the "Thor's" material was taken.

The systematic position is doubtful. The most remarkable feature is the lack of posterior segment in the urosome and telson. From the shape of p. 2, it would seem natural to refer the genus to fam. *Lysianassidæ*; it differs, however, from these in the lack of accessory flagellum on ant. 1 (*vide* note to previous species), in the lack of mandibular palp, in the maxillipeds, the shape of the epimeral plates, and of p. 5 — p. 6. In these pereiopoda, among the *Lysianassidæ*, it is always the second joint which is most extended, whereas in the present genus, this character falls to the first. P. 7, also, generally exhibits the most distinct plate formation, whereas in this case, the plate on the second joint is far smaller than on the preceding pereiopoda.

Despite the fact that the genus thus appears to differ from the *Lysianassidæ* in essential features which can hardly be attributed to biological causes alone, I prefer, at any rate as long as only this single specimen is extant, to refer the genus to the mentioned fam. on account of the shape of p. 2. Possibly it may later be found more correct to take it as the type of an entirely new family.

Like the previous species, *Thoriella islandica*, this seems, on account of the mucronate spines on the distal end of 6. joint in p. 3 — p. 6, which can turn inward towards the dactylus, to be of semi-parasitic habits. This theory is further supported by the shape of the oral parts. The mandibles are of approximately the same shape in both genera, with no palp whatever, and hardly well adapted to biting. The maxillæ are not very peculiar; the maxillipeds, however, exhibit a very remarkable uniformity in the two genera, though certain differences in detail may be observed. They are by no means adapted to biting, but appear, from the pointed outer plates, to be well suited for purposes of suction. As the two genera otherwise differ so highly in various respects, I am not inclined to consider the more or less similar structure of the maxillipeds as really indicative, of any close relationship, but merely as a biological character denoting allied habits of life.

A similar structure with a strong seventh joint and spines on the sixth of in any case some of the pereiopoda is also found in the following bathypelagic *Lysianassidæ*, all of which (with the exception of a single species) are represented in the collection made by the "Thor": *Katius obesus* Chevreux, *Paracyphocaris prædator* Chevreux, *Metacyphocaris Helgæ* Tattersall, and *Crybelocephalus megalurus* Tattersall. Chevreux has, in his description of *Paracyphocaris prædator* (Bull. Mus. Océanogr. Monaco, No. 32, 1905) advanced the theory that this species should live semi-parasitically, while Tattersall is of the same opinion regarding the two species described by himself. The material from the "Thor" has satisfactorily demonstrated that this applies to *Katius obesus*. I can therefore only conclude that all 6 species live more or less in the same manner; probably resembling the habits of *Phromina*. We have here, however, an interesting problem to be solved by future investigation.

Fam. AMPELISCIDÆ.

Genus AMPELISCA.

AMPELISCA BREVICORNIS Costa = A. LÆVIGATA Lillj.

	Araneops brevicornis		Costa, Rend. Soc. Bourbon, n. ser., vol. 2, 1853, p. 171.
	Ampelisca lævigata		Lilljeborg, Öfvers. Vet. Akad. Förh., vol. 12, 1855, p. 123.
*	—	—	G. O. Sars, Account vol. 1, 1895, p. 169, Pl. 59, fig. 1.
	—	*brevicornis*	Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 100 (*ubi lit. et syn.*).
	—	—	Stebbing, Ann. South Afric. Mus., vol. 6, pt. 1, 1908, p. 70.

St. 62. *35°45′ N, 5°59′ W.* 21-2-1909. 58 m. 8^{20} pm. 100 m. w. 1 spec.

St. 140. *37°29′ N, 12°34′ E.* 20-7-1910. 112 m. At the bottom. 1 spec.

Distribution. Arctic Ocean, North-Atlantic, North-Sea and Skagerak (S.- and W.-Norway, northwards to Lofoten Isles, British Isles, France); Kattegat, Mediterranean (Stebbing l. c. 1906). South Africa: Fresh Bay, Roman Rock, N. W. 3/4 W. 3/4 mile, 18 fath., and Table Montain, E. 41 miles, depth 245 fath. (Stebbing l. c. 1908). Ceylon (Walker, Ceylon Pearl Oyster Report, pt. 2, 1904, p. 253).

AMPELISCA SPINIPES Boeck

Ampelisca spinipes Boeck, Forhandl. 8. Skand. Naturforsker-Møde, 1861, p. 653.

* — — G. O. Sars, Account vol. 1, 1895, p. 173, Pl. 60, fig. 2.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 106 (*ubi lit.*).

St. 62. *35°45′ N, 5°59′ W.* 21-2-1909. 58 m. 8^{20} pm. 100 m. w., 6 spec.

St. 78. *51°08′ N, 1°35′ E.* 13-3-1909. 49 m. 3^{35} pm. 65 m. w. 1 spec.

Distribution. North-Sea, Skagerak, North-Atlantic and Arctic Ocean (S.- and W.-Norway, northwards to Lofoten Islands) (Stebbing l. c.).

AMPELISCA DIADEMA Costa = A. ASSIMILIS Boeck

Araneops diadema Costa, Rend. Soc. Bourbon, n. ser., vol. 2, 1853, p. 171.

Ampelisca assimilis Boeck, Forh. Vid. Selsk. Christiania, 1870, p. 222.

* — — G. O. Sars, Account vol. 1, 1895, p. 168, Pl. 58, fig. 2.

— *diadema* Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 107 (*ubi lit. et syn.*).

St. 62. *35°45′ N, 5°59′ W.* 21-2-1909. 58 m. 8^{20} pm. 100 m. w. 3 spec.

?St. 140. *37°29′ N, 12°34′ E.* 20-7-1910. 112 m. At the bottom. 6 spec.

The determination of the specimens from St. 140 is not quite certain. True, they agree as regards essentials (dactylus of p. 3 — p. 4, telson) with the fig. given by Sars; the shape of the rostero-lateral angles of the 7. pleon segment, however, and the fact that the carina on pleon segment 4 is almost entirely lacking, gives a resemblance to *A. tenuicornis*.

Distribution. From W. Norway to Mediterranean (Stebbing (l. c.).

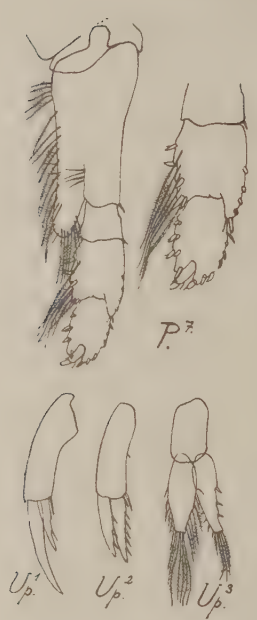

Fig. 26.
Haploops dellavallei ?

Genus HAPLOOPS.

?HAPLOOPS DELLAVALLEI Chevreux (Fig. 26).

**Haploops tubicola* Della Valle, Fauna Flora Golf. v. Neapel, vol. 20, 1893, p. 486, Pl. 3, fig. 2, Pl. 37, fig. 1—18.

Haploops Dellavallei Chevreux, Rés. Camp. Monaco, vol. 16, 1900, p. 47.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 116, 722.

St. 137. 190 m. *37°17′ N, 10°56′ E.* 19-7-1910. 1 spec. (♀), 9 mm.

The determination is not altogether certain, the endopodite of urop. 1 especially being a little too long, and the telson (not shown in the fig.) more rounded than in Della Valle's illustration (Pl. 37, fig. 8). On the whole, however, it agrees well enough with D. V.'s figures, as far as can be seen without dissection. (I have only dissected the appendages shown). In p. 7 in particular the similarity is altogether very close, and joint 5 exhibits the characteristic form as shown by my fig. here given. The 6. joint, however, is in my specimen twice as long as 7. whereas in D. V.'s figs., these two joints are of equal length. Both exop. and endop. in urop. 3 have a slightly different shape in the specimen from the "Thor", being in particular more abruptly cut off at the point.

Distribution. Gulf of Naples, 20—40 m (Della Valle).

Fam. HAUSTORIIDÆ.

Genus UROTHOE.

UROTHOE PULCHELLA Costa

Egidia pulchella Costa, Rend. Soc. Bourbon n. ser., vol. 2, 1853, p. 172.

**Urothoe* — Stebbing, Transact. Zool. Soc. London, vol. 13, 1891, p. 11, Pl. 4, fig. A.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 130 (*ubi lit. et syn.*).

St. 135. *37°17′ N, 10°28′ E.* 16-7-1910. 200 m. 12^{55} am. 25 m. w. 1 spec.

Distributions. Gulf of Naples, West France (Stebbing l. c. 1906).

Fam. COLOMASTIGIDÆ.

Genus COLOMASTIX.

COLOMASTIX PUSILLUS Grube

Colomastix pusillus Grube, Ausfl. Triest, 1861, p. 137.

* — — Della Valle, Fauna Flora Golf. Neapel, vol. 20, 1893, p. 854, Pl. 6, fig. 2, Pl. 61, fig. 23—37.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 207 (*ubi lit.*).

— — Pearse, Proc. U. S. Nat. Mus., vol. 43, 1913, p. 370, fig. 2.

St. 142. *35°44′ N, 15°07′ E.* 22-7-1910. 98 m. 2 spec.

Distribution. North Atlantic (France, Great Britain), Mediterranean (Stebbing l. c.). E. America between Delta

of Missisippi and Cedar Keys, 25—27 fathoms (Pearse l. c.). Ceylon (Walker, Ceylon Pearl Oyster Report, pt. 2, 1904, p. 299).

Fam. OEDICERATIDÆ.

Genus MONOCULODES.

MONOCULODES CARINATUS Bate

Westwoodea carinata Bate, Report Brit. Assoc. Meet. 25, 1856, p. 58.

**Monoculodes carinatus* G. O. Sars, Account vol. 1, 1895, p. 295, Pl. 105.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 261 (*ubi lit. et syn.*).

St. 153. *32°45′ N, 22°41′ E.* 28-7-1910. 13 m. 1 spec.

Distribution. From Norway to Gulf of Naples (Stebbing l. c.).

Fam. CALLIOPIIDÆ.

Genus STENOPLEURA.

STENOPLEURA ATLANTICA Stebbing (Fig. 27).

**Stenopleura atlantica* Stebbing, Challenger-Amphip., 1888, p. 950, Pl. 84.

Acanthozone — Della Valle, Fauna Flora Golf. Neapel vol. 20, 1893, p. 601, Pl. 59, fig. 10 (not fig. 11, as cited in Das Tierreich).

Stenopleura atlantica Stebbing, Amphip. Gamm., Das Tierreich, 1906, p. 302.

St. 69. *36°13′ N, 9°48′ W.* 28-2-1909. >3500 m. 3^{05} pm. 300 m. w. 1 ♀, 8 mm.

St. 89. *36°28′ N, 8°22′ W.* 18-6-1910. 1310 m. 3^{25} am. 300 m. w. 1 ♂, 6 mm.

In spite of some slight deviations from Stebbing's description, as will be seen from the following, there can be no doubt as to the correctness of the determination. As the specimen which Stebbing has dissected and described in the Challenger-Expedition was somewhat defective, I have myself dissected one of the two specimens from the "Thor" (a ♂) and give the drawings here by way of supplement to the description furnished by Stebbing.

♂, 6 mm. The contours of the cephalosome somewhat different from those given by Stebbing. The rostrum is too large to be properly called "inconspicuous", and the postantennal corners are fairly large (Stebbing says "not produced"). Eyes fairly large, ocelli dark brown. In ant. 1, the flagellum has 37 joints, in ant. 2 likewise 37 (Stebbing gives 33 and 35 respectively); in the first pair, the length corresponds to Stebbing's habitus fig., but the second pair are slightly longer, not shorter, as Stebbing's figure shows. The shape of the anterior and inferior lips will be seen from my fig.; the inferior lip has, as far as I have been able to see from my dissected specimen, very great inner lobes. A fig. of the maxillipeds is also given here, in order

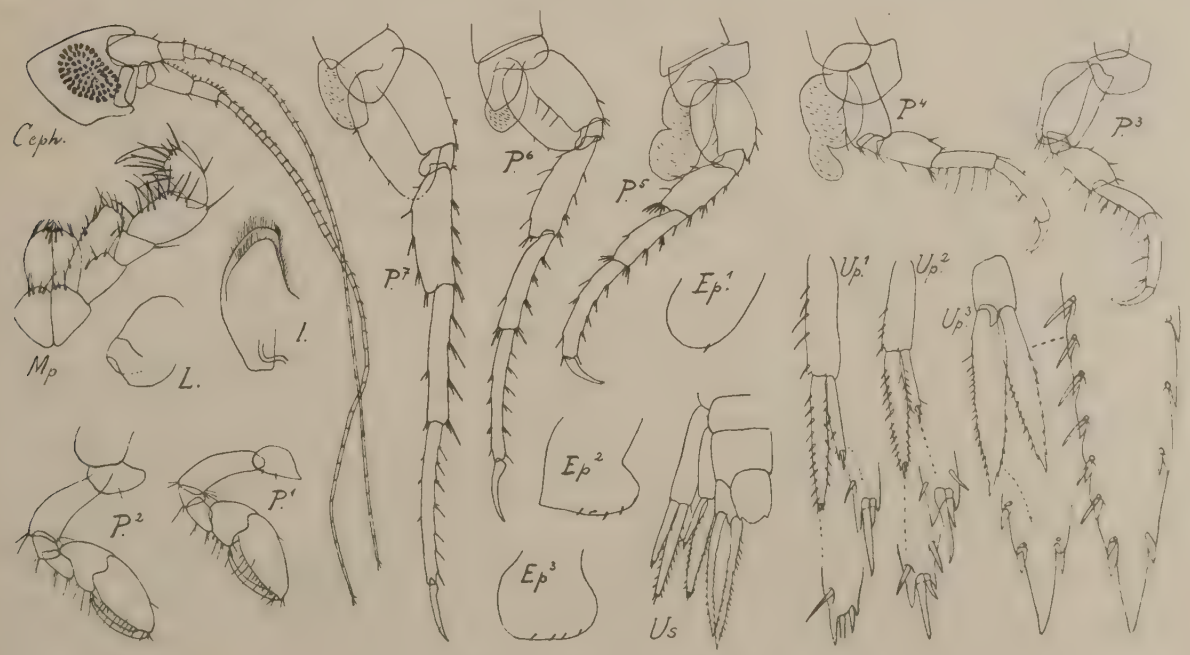

Fig. 27. Stenopleura atlantica ♂.

to show certain details not apparent from Stebbing's figure.

As all my figs. of p. 1 — p. 7 are drawn to the same scale, the comparative lengths can be seen from these. P. 5 is only slightly longer than p. 4; p. 6 still longer; p. 7 extends out to the very point of the telson. The shape of the epimeral plates on the metasome will be seen from my fig. here given. The median posterior portion of the telson is not triangularly pointed, but evenly rounded.

♀, 8 mm. Closely resembles ♂, the eyes however, being somewhat smaller, and the antennæ slightly shorter than in ♂. More remarkable is the fact that p. 5 — p. 7 especially are long and slender, p. 7 even extending out to the point of urop. 3.

As regards colour, both sexes are (in alcohol) semi-transparent and colourless.

Distribution. *35°41′ S, 20°55′ W* (off Tristan da Cunha) and *1°47′ N, 24°26′ W*, 1850 fath. globigerina ooze, bt. *36°6 F.* (Challenger). In Das Tierreich, the distribution is given as to lat. *2°—3° N*, long. *8°24′ W;* I have not, however, been able to discover from what source. In addition, Chevreux records it in Bull. Mus. Océanogr. Monaco, No. 35, 1905, p. 7, from St. 1781: *31°06′ N, 24°08′45″ W*, 0—5000 m.; St. 1794: *31°46′ N, 25°W*, 0—3000 m, 5425 m, and from Funchal, Madeira.

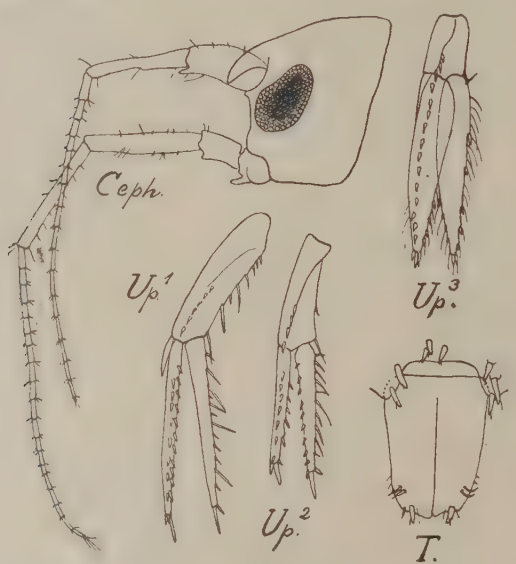

Fig. 28. Nototropis vedlomensis ♀ from Norway.

Genus APHERUSA.

APHERUSA BISPINOSA Bate

Dexamine bispinosa Bate, Ann. Nat. Hist., ser. 2, vol. 19, 1857, p. 142.

**Apherusa* — G. O. Sars, Account vol. 1, 1895, p. 439, Pl. 155, fig. 1.

Apherusa bispinosa Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 305 (*ubi lit. et syn.*).

— — Sexton, Journ. Mar. Biol. Assoc. Plymouth, vol. 9, No. 2, 1911, p. 208, Pl. 3, fig. 9.

St. 94. *36°06′ N, 6°02′ W.* 23-6-1910. 65 m. 0^{35} am. 65 m. w. 1 spec.

St. 281. *38°15′ N, 15°36′5 E.* 1-3-1911 (200 m.). 3^{45}—4^{45} pm. 10 m. w., 10 spec.; 30 m. w., 6 spec.

Distribution. Recorded by Sars (l. c.) from Norway to Algiers. Has also been taken off E. coast of Greenland, abt. *77° N* (K. Stephensen, Danmark-Exped.; Meddel. om Grønland, vol. 45, 1912, p. 538).

Fam. ATYLIDÆ.

Genus NOTOTROPIS.

NOTOTROPIS (PARATYLUS) VEDLOMENSIS Bate & Westwood (Fig. 28)

Dexamine vedlomensis Bate et Westwood, Brit. sessile-eyed Crust., vol. 1, 1862, p. 242, figs.

**Paratylus* — G. O. Sars, Account vol. 1, 1895, p. 466, Pl. 164, fig. 2.

Nototropis — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 331 (*ubi lit. et syn.*).

Atylus — Boeck, Skand. og Arkt. Amphipoder 1876, p. 330 (*partim*), Pl. 9, fig. 9, Pl. 11, fig. 6 (*non* fig. 6 l, 6 m [and fig. 6 n?] = *Nototropis guttatus* Costa).

St. 62. *35°45′ N, 5°59′ W.* 21-2-1909. 58 m. 8^{25} pm. 100 m. w. 2 spec. (♀), 8 mm, one with eggs.

Further see the next species.

NOTOTROPIS GUTTATUS Costa (Fig. 29—31).

**Nototropis guttatus* Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 331 (*ubi lit. et syn.*).

Atylus vedlomensis Boeck, Skand. og Arkt. Amphipoder 1876, p. 330 (*partim*), Pl. 11, fig. 6 l, 6 m (and fig. 6 n?).

St. 62. *35°45′ N, 5°59′ W.* 21-2-1909. 58 m. 8^{25} pm. 100 m. w. 4 spec. (♂).

St. 78. *51°08′ N, 1°35′ E.* 13-3-1909. 49 m. 3^{35} pm. 65 m. w. 1 spec. (♂).

Of all the illustrated works quoted by Stebbing, the only one I have been able to obtain is Sowinski's paper in Mém. Soc. Kiew, vol. 4, 1895 (in Russian); I have therefore been obliged to trust almost exclusively to Stebbing's own description. There can be

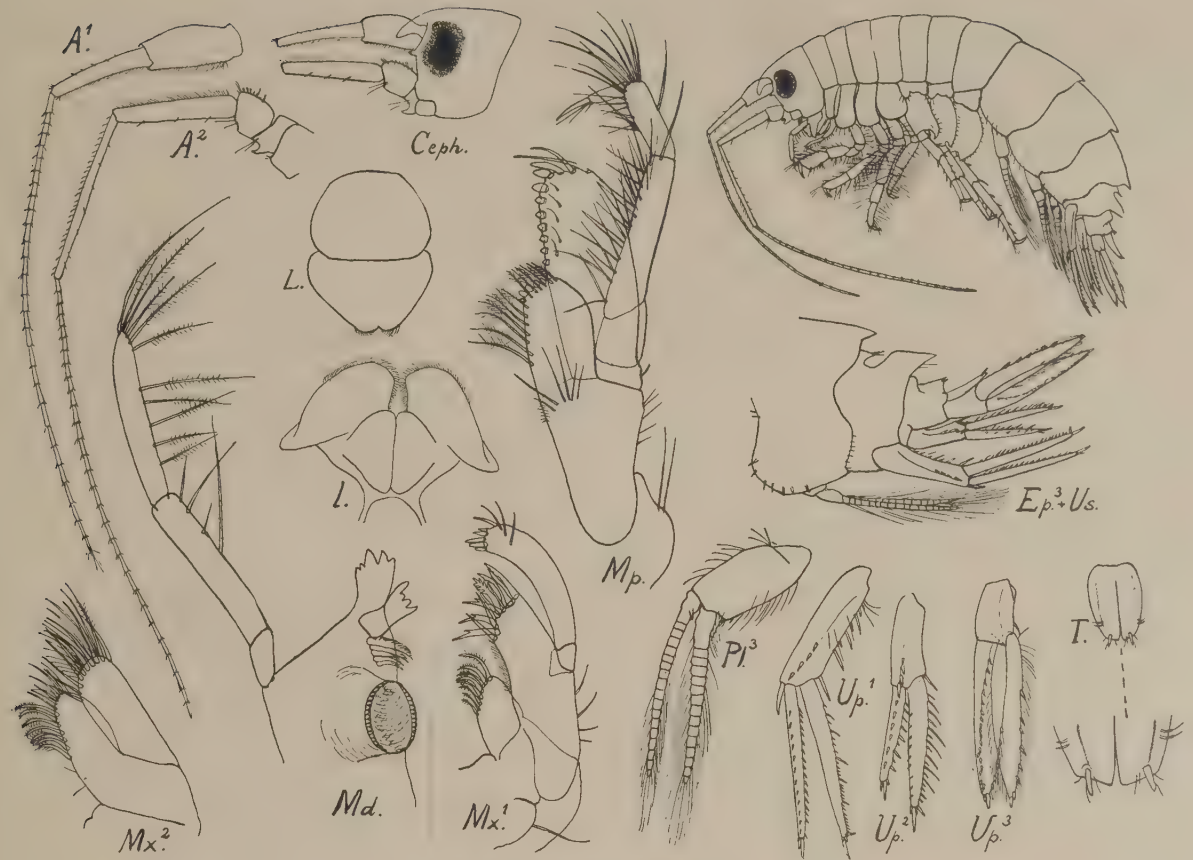

Fig. 29. Nototropis guttatus ♂.

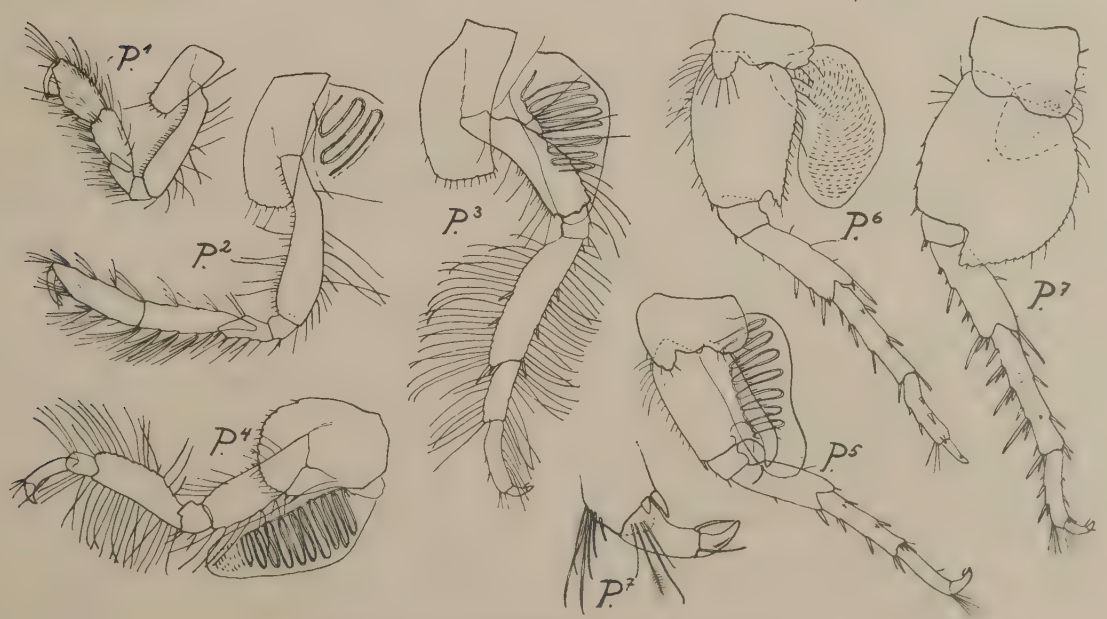

Fig. 30. Nototropis guttatus ♂. The pereiopoda.

no doubt of the fact that my specimens really belong to *N. guttatus*; they differ, however, in some respects from Stebbing's description. As moreover almost all the illustrations mentioned by Stebbing are of far from recent date, I have thought it best to dissect a

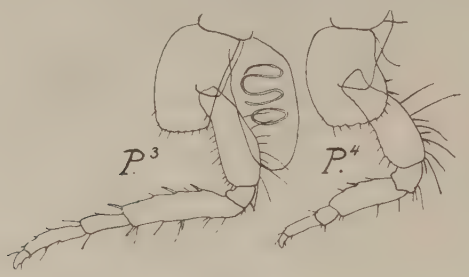

Fig. 31. Nototropis guttatus juv. (♂?), 7 mm, Norway.

specimen and draw new figures. The species is very closely related to *N. vedlomensis*, with which it has also frequently been confused; I have therefore also dissected a specimen of this and give here some figures which may serve to supplement those given by Sars in his Account.

The rostrum is rounded at the point, and evenly pointed. The upper lobe of the lateral margin of the cephalon is sharply defined, but rounded at the point; in the specimens of *N. vedlom.* preserved at our Zool. Museum, it is of exactly the same shape, and not triangularly pointed, as shown by Sars in the Account. As a matter of fact, it is impossible to find any real difference in the cephalon of the two species except the form of the eyes. The first joint of the peduncle in ant. 1 of *N. vedl.* has the inferior portion of its distal end produced out into a not altogether insignificant tooth, which in *N. gutt.* is either not present at all or in any case entirely negligible.

The 4 and 5. joints of p. 3 — p. 4 are marginally beset with long setæ and some few spines (*N. vedl.* has short spines only); this character is, with the gills, the best distinguishing mark of species which I have been able to find in the specimens to which I have had access. (In a young spec. of *N. gutt.* from Norway, — ♂?, 6 mm — these long setæ were not present [*vide* fig. 31]). The hook at the back of 2. joint in p. 5 is, in my specimens, of exactly the same shape as in *N. vedl.* (Stebbing says: "the lower hind corner much less distinctly uncinate than in *N. vedl.*"): this is, as a matter of fact, the only point which occasioned me any hesitation with regard to my determination. The second joint of p. 7 is somewhat longer in proportion than that of *N. vedl.* I append figs. of urop. 1—3 and telson of *N. vedl.*; these parts, however, are entirely similar to those of *N. gutt.*

On going through the material of *N. vedl.* at the Museum (where, by the way, there was nothing noted as *N. gutt.*) I found two specimens of *N. gutt.* together with *N. vedl.* in a glass marked "*Paratylus vedlomensis* Sp. Bate; Norveg. occidend. G. O. Sars ded.". In addition, there were 3 specimens from Denmark, taken by the "Hauch", St. 29, 72 and ? (northern Kattegat, mentioned by Meinert in "Det videnskabelige Udbytte af Kanonbaaden "Hauch's" Togter, 1890, p. 165).

It is evident that Boeck, (l. c. 1876) has confused these two species both in his descriptions and his drawings. In Pl. 11, figs. 6 l (p. 3 or p. 4) and 6 m (p. 5) at least belong to *N. guttatus*; possibly also fig. 6 n (p. 7), the 2. joint being apparently too broad to belong to *N. vedlomensis.*

It would in any case seem certain that the distribution given by Stebbing for *N. gutt.* may be extended to embrace the Kattegat and W. Norway.

Fam. EUSIRIDÆ.

Genus EUSIRUS.

EUSIRUS LONGIPES Boeck

Eusirus longipes Boeck, Forhandl. 8. Skandinav. Naturforsker Møde 1861, p. 656.

* — — G. O. Sars, Account vol. 1, 1895, p. 420, pl. 148, fig. 1.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 341 (*ubi lit.*).

St. 63. *35°50′ N, 6°03′ W.* 23-2-1909. 490 m. 1^{45} am. 600 m. w. 5 spec.

St. 140. *37°29′ N, 12°34′ W.* 20-7-1910. 112 m. At the bottom. 1 spec.

Distribution. Arctic Ocean, North Atlantic, North Sea and Skagerrak (Norway, depth 56—188 m; Shetland Isles; Firth of Clyde; France); Adriatic (Stebbing l. c.). E. W. Sexton gives in Proc. Zool. Soc. London, 1909, p. 864 a very detailed synopsis of the distribution and quotes the sources.

Fam. GAMMARIDÆ.

Genus MÆRA.

MÆRA SCHMIDTII n. sp. (Fig. 32)

St. 126. *42°43′ N, 9°50′ E.* 10-7-1910. 600—620 m. 10^{10} pm. ½ spec. (12 mm?).

St. 139. *37°57′ N, 11°54′ E.* 27-7-1910. 680 m. At the bottom. 3 spec. each 10 mm, 1 spec., 12 mm.

St. 140. *37°29′ N, 12°34′ E.* 27-7-1910. 112 m. At the bottom. 1 spec., 10 mm.

In addition to the 23 species of genus *Mæra* mentioned by Stebbing in Das Tierreich, Amphip. Gamm. 1906, p. 433 og 732 the following species are known:

M. spinicauda Holmes, Proc. U. S. Nat. Mus., vol. 35, 1908, p. 539, fig. 45.
M. Rathbunæ Pearse, *ibid.* vol. 34, 1908, p. 29.
M. tinkerensis Kunkel, New Haven Transact. Connecticut Acad., vol. 16, 1910, p. 49, figs.
M. prionochira v. d. Brüggen, St. Petersbourg Ann. Mus. Zool., vol. 11, 1906 (1907), p. 230.

The present species is not, however, identical with any previously described.

The following description is based on a dissected specimen (♂) 10 mm long. True, we have in the material parts of one or two larger individuals, (abt. 12 mm) but these are not complete, and therefore unsuitable for purposes of description. Moreover, the differences are, at any rate, as far as it was possible to see without dissection, so slight as to render smaller specimens equally adapted for the purpose.

The species in question is a typical *Mæra*, so there can be no doubt of the fact that it does not belong to any of the related species. It is not particularly slender, resembling in this respect *N. othonis*. The cephalosome is about the length of the two first segments of the body together. Lateral lobes rounded, the lower corner almost rectangular. The eyes light, of medium size, slightly broader in the lower part than in the upper. The whole of the dorsum is entirely glabrous; with regard to the segments of the body, metasome, and urosome there is nothing particular to note save that the first segment of the urosome bears a hump, and that the epimeral parts of the 3. segment in the metasome have their posterior portion without the slightest indication of marginal dentition; there are two spines, however, close to the anterior portion of the lower edge.

The antennæ are comparatively short. In ant. 1, the flagellum has 16 joints, of which the last is very small. The accessory flagellum is about the length of the first joint of the antenna, and consists of four joints, of which No. 3 in the longest. In ant. 2, the flagellum has only 7 short joints, these making up together about $^1/_3$rd of the length of the antenna.

The oral parts correspond on the whole to Sars' fig. of those in *M. othonis* (Account, vol. 1, Pl. 182). The labrum I have not drawn, as it entirely resembles Sars' fig. (Pl. 182, 1 L.). In the mandibles, the palps are only very slightly beset with setæ, the molar expansion is extraordinarily broad, (across the longitudinal axis of the mandibles) and has its proximal margin furnished with a long, downward pointing, pennate spine. With regard to the maxillæ, there is nothing particular to remark, save that the outer plate appears to have but 6 spines, not 10, as Stebbing says (Tierreich, p. 433). On the inner plate of the maxillipeds I have only been able to find two spine teeth (on the median and lateral corners) not three (Stebbing l. c. p. 433). The inner lobe of the labrum appears to be slightly smaller than shown by Sars in *N. othonis* (Account, vol. 1, Pl. 182).

Fig. 32. Mæra Schmidti.

The pereiopoda resemble those of *M. othonis*, differing however in several distinct features. The first joint of p. 1 is pointed at the anterior end and has 6 teeth the more or less regularly distributed over the whole of the lower edge. On p. 2, the first joint has 3 teeth below, (that in the anterior corner not included); the 5. joint is somewhat longer in proportion than in ♂ of *M. othonis*, and the dactylus is only very slightly curved. With regard to p. 3 and p. 4, there is nothing particular to remark; the arrangement of the teeth on the lower edge of 1. joint will be seen from fig. 32. P. 5 — p. 7 also resemble the corresponding appendages in *M. othonis*; the second joint in p. 5, however, is far more slender. These three pairs of pereiopoda have strong spines on the anterior, and teeth on the posterior edge of the second joint. The pleopoda are slender, the endop. however somewhat longer than the exop. The two feet of each pair are connected together by means of peculiar dentate spines (*vide* Fig.). The uropoda are very characteristic. Urop. 1 is almost as long as urop. 3, and has, on the outer side of the stem, a little in front of the centre, a strong spine, which feature, as far as I can see from extant works, distinguishes this species from all others. Urop. 2 and urop. 3 are of about equal length, but do not, of course project equally far back, being attached in different places. In urop. 3, the branches are slender and pointed, with only a single thin spine at the point, fixed in a small notch. The outer margins of the telson are convex; there are two comparatively long and thick spines at the point.

In accordance with the above, this species can, in contrast to the others, be characterised by a combination of the following features: the light eyes, the 4 joints in the accessory flagellum, the shape of the coxal plates especially in p. 1 and p. 2, the epimeral part of the 3rd segment in the metasome, the large spine on the outer side of the peduncle in urop. 1, the shape of urop. 3, and the heavy spines at the point of the telson.

I have taken the liberty of naming this species after the leader of the expedition, Dr. Johs. Schmidt.

MÆRA GROSSIMANA Mont.

Cancer (*Gammarus*) *grossimanus* Montagu, Transact. Linn. Soc. London, vol. 9, 1808, p. 97, Pl. 4, fig. 5.

**Mæra grossimanus* (*partim*) Della Valle, Flora u. Fauna Golf. Neapel, vol. 20, 1893, p. 727, Pl. 2, fig. 10, Pl. 21, fig. 1—16, Pl. 41, fig. 37.

Mæra grossimana Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 435 (*ubi lit. et syn.*).

St. 105. *37°43′ N, 2°08′ W.* 24-6-1910. 20 m. 8^{15} pm. At the bottom. 1 spec.
St. 140. *37°29′ N, 12°34′ E.* 27-7-1910. 112 m. At the bottom. 1 spec.
St. 207. *40°18′ N, 3°20′ E.* 28-8-1910. > 1600 m. At the bottom. 1 spec.

Distribution. From S.-England and W.-France to Azores and Mediterranean (Stebbing l. c.).

Genus GAMMARUS.

GAMMARUS LOCUSTA L.

Cancer locusta Linné, Systema naturæ, edit. 10, 1758, p. 634.

**Gammarus* — G. O. Sars, Account vol. 1, 1895, p. 499, Pl. 1, Pl. 176, fig. 1.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 476 (*ubi lit. et syn.*).

St. 58. Valentia Harbour, on the shore. 28-5-1906. 2 spec.
St. 78. *51°08′ N, 1°35′ E.* 49 m. 65 m. w. 1 spec.
? Piræus, the harbour, between algæ. 0.12 m. 2-1-1909. 1 spec. (defective).
? Cadiz, between algæ. 6 m. 24-2-1909. 1 spec. (defective).

Distribution. Almost cosmopolitan; see K. Stephensen, Conspectus Crust. et Pycnog. Groenlandiæ; Meddel. om Grønland, vol. 22, 1913, p. 192—94.

Fam. DEXAMINIDÆ.

Genus DEXAMINE.

DEXAMINE SPINOSA Mont.

Cancer (*Gammarus*) *spinosus* Montagu, Transact. Linn. Soc. London, vol. 11, 1813, p. 3, Pl. 2, fig. 1.

**Dexamine spinosa* G. O. Sars, Account vol. 1, 1895, p. 475, Pl. 166, fig. 2, Pl. 167.

— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 515 (*ubi lit. et syn.*).

St. 135. *37°17′ N, 10°28′ E.* 16-7-1910. 200 m. 0^{55} am. 25 m. w. 1 spec.
St. 281. Between Faro and St. Agata, 1-3-1911. 3^{45}—4^{45} pm. 30 m. w. 1 spec.

In the specimen from St. 135 1. joint in ant. 1 is produced to an acute, not obtuse tooth. In the specimen from St. 281 this tooth is not very acute, but not as obtuse as in Sars' figure (Account Pl. 167).

Distribution. From Arctic Ocean to Azores and Black Sea (Stebbing l. c.).

Fam. TALITRIDÆ.

Genus HYALE.

HYALE GRIMALDII Chevreux

**Hyale Grimaldii* Chevreux, Bull. Soc. Zool. France, vol. 16, 1891, p. 257, fig. 1—5.
— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 567.

St. 132. *38°37′ N, 9°47′ E.* 14-7-1910. Ca. 10 small spec.
Found between green filiform algæ on the back of a couple of sea turtles (*Thalassochelys corticata*) taken at the surface.

Distribution. *42° N, 24° W; 38° N, 64° W;* West Mediterranean. On floating objects and *Thalassochelys* (Stebbing l. c.).

HYALE PONTICA Rathke

Hyale pontica Rathke, Mém. prés. Ac. St.-Péterbourg, vol. 3, 1837, p. 378, Pl. 5, fig. 20—28.
* — *lubbockiana* G. O. Sars, Account vol. 1, 1895, p. 27, Pl. 11, fig. 2.
— *pontica* Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 568 (*ubi lit. et syn.*).

Mentone, between algæ at the shore. 26-1-1909. 1 spec.
Distribution. From West Norway to Algeria (Stebbing l. c.). Ceylon (Walker, Ceylon Pearl Oyster Report, pt. 2, 1904, p. 258).

HYALE SCHMIDTII Heller

Nicæa schmidtii Heller, Denkschr. Akad. Wien, vol. 26, pt. 2, 1866, p. 11, Pl. 1, fig. 31, 32.
Hyale — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 571 (*ubi lit. et syn.*).
* — *camptonyx* Chevreux, Rés. Camp. Sci. Monaco, vol. 16, 1900, p. 12, Pl. 2, fig. 3 (*teste* Chevreux l. c. 1910 [1911]).
* — *schmidtii* Chevreux, Mém. Soc. Zool. France, vol. 23, No. 3—4, 1910 [1911], p. 237, Pl. 16, fig. 9—12.

Taormina, on the shore. 7-1-1909. 1 ♂.
Distribution. Mediterranean; Adriatic; North-Atlantic (Portugal) (Stebbing l. c.).

? HYALE CAMPTONYX Heller

Nicæa camptonyx Heller, Denkschr. Akad. Wien, vol. 26, pt. 2, 1866, p. 10, Pl. 1, fig. 25—30.
Hyale — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 570 (*ubi lit. et syn.*).
* — — Chevreux, Mém. Soc. Zool. France, vol. 23, No. 3—4, 1910 (1911), p. 236, Pl. 16, fig. 3—8.
non — — Chevreux, Rés. Camp. Sci. Monaco, vol. 16, 1900, p. 12, Pl. 2, fig. 3 (= *H. Schmidtii* Heller).

St. 10. *37°21′ N, 16°45′ E.* 15-12-1908. 1200 m. w. 1 ♀ with eggs, 4 mm.
Determination not quite certain; the eyes for instance, are very large.

Distribution. Mediterranean; Adriatic; Portugal; Azores. In seaweed and on a floating log (Stebbing l. c.).

Fam. PHOTIDÆ.

A defective individual, indeterminable even as to genus, was taken at St. 132, *38°57′ N, 9°47′ E.* 14-7-1910, and is only mentioned owing to the fact of its having been found together with various other crustaceans among green filiform algæ on the back of a couple of *Thalassochelys corticata.*

Genus PHOTIS.

PHOTIS LONGICAUDATA Bate

Eiscladus longicaudatus Bate and Westwood, British sessile-eyed Crust., vol. 1, 1862, p. 412, with figs.
**Photis* — G. O. Sars, Account vol. 1, 1895, p. 571, Pl. 203, fig. 1.
— — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 608 (*ubi lit. et syn.*).

St. 140. *37°29′ N, 12°34′ E.* 20-7-1910. 112 m. 1 spec.
Distribution. From Norway and Denmark to Mediterranean (Naples) (Stebbing l. c.). Ceylon (Walker, Ceylon Pearl Oyster Report, pt. 2, 1904, p. 286, Pl. 6, fig. 43).

Genus EURYSTHEUS.

EURYSTHEUS sp.

St. 41. *39°10′ N, 9°35′ E.* 2-2-1909. On the shore. 1 spec. (defective).

Fam. AMPITHOIDÆ (= AMPHITOIDÆ).

Genus AMPITHOE (= AMPHITHOE).

AMPITHOE VAILLANTII Lucas

Amphithoe vaillantii Lucas, Explor. Algérie, Anim. artic. vol. 1, 1846, p. 54, Crust. (vol. 4), Pl. 5, fig. 3.
Ampithoe — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 639 (*ubi lit. et syn.*).
**Amphithoe* — Chevreux, Mém. Soc. Zool. France, vol. 23, No. 3—4, 1910 (1911), p. 260, Pl. 20, fig. 1—4.

St. 41. *39°10′ N, 9°35′ E.* 2-2-1909. On the shore. 1 spec.
St. 105. *37°43′ N, 2°08′ W.* 24-6-1910. 20 m. 2 spec.

Distribution. From N. W. France to Black Sea and Red Sea (Chevreux l. c.). Ceylon (Walker, Ceylon Pearl Oyster Report, pt. 2, 1904, p. 291).

Fam. COROPHIIDÆ.

Genus ERICTHONIUS.

? ERICTHONIUS DIFFORMIS M.-Edw.

Ericthonius difformis Milne-Edwards, Ann. Sci. Naturelle, vol. 20, 1830, p. 382.
**Erichthonius* — G. O. Sars, Account vol. 1, 1895, p. 604, Pl. 216, fig. 1.
Ericthonius — Stebbing, Amphip. Gamm., Das Tierreich 1906, p. 672 (*ubi lit. et syn.*).

St. 140. *37°29′ N, 12°34′ E.* 20-7-1910. 112 m. 2 spec. Determination not certain.

Distribution. From Trondhjemsfjord to Black Sea and Azores; United States of America (Stebbing l. c.).

Genus COROPHIUM.

COROPHIUM ROTUNDIROSTRE n. sp. (Fig. 33)

St. 140. *37°29′ N, 12°34′ E.* 20-7-1910. 112 m. Clay. 2 spec.

Both specimens (♀ 5.5 mm and ♂ 4 mm) are unfortunately somewhat defective. The illustrations and description apply to the larger of the two, a ♀, which has been dissected. As far as could be determined without dissection, there appears to be entire uniformity between the sexes in all visible features, both specimens here lacking the most important features for determination of sex (with the exception of the marsupial plate) there being nothing left of the second

Fig. 33. Corophium rotundirostre.

pair of antennæ beyond the two innermost segments of the stem.

Bradley gives, in University of California publications in Zool., Berkeley, vol. 4, No. 4, 1908, p. 229—30, a list and key of all the known species of genus *Corophium*; according to this, the present species should be *C. volutator* Pallas = *C. grossipes* L., which however, is quite out of the question. Since then, Chevreux has, in Bull. Soc. Zool. France, vol. 33, No. 3—4, 1908, p. 69—73, described 3 species from the Mediterranean, (*C. aculeatum*, *C. annulatum* and *C. acutum*) Vanhøffen has also described a brackish-water species (*C. lacustre*) in Sitzungsber. Gesellsch. naturforsch. Freunde, Berlin, 1911, p. 400, and Wundsch a fresh-water species (*C. devium*) in Zool. Anzeiger vol. 39, 1912, p. 732.

This is all that we have in the way of description and illustration of the *Corophium* species since Stebbing's Amphip. Gamm. in Das Tierreich; the present species, however, does not correspond to any of those hitherto described.

Its general appearance is typical of the genus, and I therefore give no drawing of the whole animal. The species belongs to that group in which the three segments of the urosome are not fused together. The rostrum is rounded, almost semicircular, the ocular lobes are oval, projecting forward about as far as the rostrum. Each eye has 5—6 black ocelli. Ant. 1 is of the usual form; the first stem-joint, however, has on its median side a spine close to the base. The flagellum consists of 8 joints. Of ant. 2, only the two first segments are preserved, the first one has a pointed process on the median, downturned side. Unfortunately, all the remaining parts of ant. 2 are missing, both in ♂ and ♀. With regard to the oral parts there is nothing particular to remark save that the first segment of the mandibular palp is produced in a long process, and the maxillipeds far more thickly beset with setæ than in *C. grossipes* (G. O. Sars, Account, vol. 1, Pl. 219).

In the pereiopoda, the epimeral parts are of the usual form. The 2. joint of p. 1 has a convexity on the posterior side of the distal end, and the dactylus is somewhat longer than the terminal surface of the preceding segment. In p. 2, the 5th joint is of peculiar shape, being constricted towards the end and thereafter widening out again. The dactylus is comparatively long and thin, without teeth. In p. 3 — p. 4 the dactylus is longer than the two preceeding joints together, and the 5. joint is drawn out in the distal end. P. 5 and p. 6 are almost alike, p. 6 however, being slightly longer and with more setæ than p. 5. With regard to p. 7, nothing particular to remark save that here also the dactylus is comparatively long.

The pleopoda are of the usual form; on the inner side of the stem there are two peculiar spines (*vide* detail fig.). Sars appears (Account, Pl. 218) to have drawn something similar in *Siphonoecetes Colletti*, not, however, in any of the *Corophium* species. The shape of the somewhat long and slender urop. will be seen from fig.; urop. 3 is linear, with a very slight projection on the median side of the stem. The telson is trilobate, and rounded, about the same shape as that of *C. grossipes*.

On account of the round rostrum I suggest the specific name *C. rotundirostre*.

2. Caprellidea.

Fam. CAPRELLIDÆ.

Genus CAPRELLA.

CAPRELLA ACUTIFRONS Latr. forma **ANDRÉÆ** P. Mayer.

Caprella acutifrons forma *Andreæ* P. Mayer, Caprell. Golf. Neapel, Nachtrag; Fauna u. Flora Golf. Neapel, vol. 17, 1890, p. 52, 55, Pl. 2, fig. 38, Pl. 4, fig. 56, 70, 71.

— — — — P. Mayer, Caprell.; Siboga-Exped., Livr. 12 (Monogr. 34), 1903, p. 80 etc.

St. 132. *38°57′ N, 9°47′ E.* 14-7-1910.

From green filiform algæ on the back of a couple of sea turtles (*Thalassochelys corticata*) taken at the surface. A considerable number of specimens, ♂ and ♀, (3—)13 mm; the determination of the smaller individuals is somewhat uncertain, owing to their insignificant size.

Distribution. P. Mayer records this variety in the two works quoted with a very wide distribution from the warmer parts of both Atlantic and Pacific. He also mentions it from Naples, driven in to the bay on corks and on the trunk of a tree. The variety is pelagic, or more correctly, passively pelagic on floating objects of all kinds, also turtles. It has occasionally been taken with a number of other animals (P. Mayer l. c. 1890, p. 55). Van Beneden has, in Notice sur la tortue franche (*Chelonia midas*) dans la mer du Nord, ses commensaux et ses parasites (Bull. Acad. Royale de Belgique, ser. 2, vol. 6, No. 1, p. 10—13, Pl. 1, fig. 9—11), a work, which appears to have been overlooked by nearly all subsequent writers, mentioned *C. acutifrons* as found together with *Tanais Dulongii* Sav. The specimens from the "Thor" were found together with *Tanais robustus*, *Hyale Grimaldi*, *H. camptonyx* (?), and *Photidæ* fam. (?).

REPORT ON THE DANISH OCEANOGRAPHICAL EXPEDITIONS 1908-10
TO THE MEDITERRANEAN AND ADJACENT SEAS
Vol. II. Biology.

K. 1.

Calcareous Algae

by

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With one Plate and 10 text-figures.

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TABLE DES MATIÈRES

page

I. Introduction 3
II. Les espèces recueillies par le "Thor" 6
A. Description des espèces 6
B. Conclusions 21
III. Répartition géographique des Corallinacées méditerranéennes 22
Bibliographie 29
Explication de la Planche 30

I. Introduction.

Pendant les deux expéditions du "Thor" commandées par le Docteur Johs. Schmidt en 1908—1909 et en 1910, M. M. Paulsen et Ostenfeld ont recueilli un grand nombre d'échantillons fort intéressants d'algues calcaires. La flore algologique de la Méditerranée a déjà été bien étudiée; aussi n'est-il pas étonnant qu'il ne se soit trouvé parmi eux aucune espèce nouvelle; mais les échantillons ont été récueillis dans un très grand nombre de stations, à des profondeurs très grandes, de sorte que les récoltes du "Thor" apportent des contributions fort importantes pour l'habitat et la distribution d'un certain nombre d'espèces et permettent d'en tirer des conclusions générales pour l'ensemble des Mélobésiées.

En effet si la flore de Mélobésiées de la Méditerranée occidentale est assez bien connue, il n'en est pas de même de celle de la Méditerranée orientale; on en aura une idée lorsqu'on saura que 8 espèces seulement ont été signalés jusqu'ici dans la Mer Egée et les rivages de la Grèce.

Dans ce travail je n'ai pas indiqué la bibliographie des espèces que j'ai déjà étudiées précédemment (Lemoine, Structure anatomique des Mélobésiées, 1911); pour éviter de repéter à nouveau des indications bibliographiques nombreuses et compliquées, j'ai simplement renvoyé à ce travail. Je n'ai donc insisté que sur la bibliographie des espèces que je n'ai pas encore eu l'occasion de traiter, ainsi que sur leurs caractères, de façon à faire pour chaque espèce une description d'ensemble.

Les résultats de l'Expédition du "Thor" sont surtout d'ordre géographique et permettent d'indiquer, pour toutes les espèces récoltées, un certain nombre de localités nouvelles. Pour faire ressortir ces résultats, je me suis attachée à relever avec grand soin la liste des localités où ces espèces ont été signalées précédemment dans la Méditerranée; mais je n'ai pas donné les indications bibliographiques correspondantes, qui auraient surchargé le texte et nui à la clarté de l'exposé. J'ai d'ailleurs l'intention de publier ultérieurement un catalogue général de la distribution géographique des Mélobésiées dans toutes les mers du globe.

Il me reste à remercier vivement le Docteur Johs. Schmidt d'avoir bien voulu me confier la détermination des espèces recueillies par le "Thor", et d'avoir publié ce travail.

Indication des Stations avec la liste des espèces qui y ont été recueillies.

I. Expédition du "Thor" de 1908—1909.

Espèces recueillies par M. Paulsen.

Sicile: Taormine, 14 Décembre 1908, profondeur 3 à 16 mètres.

Lithothamnium Haucki
Lithophyllum incrustans
Lithophyllum expansum
Lithoph. (Dermatolithon) pustulatum
Tenarea tortuosa
Melobesia (Pliostroma) zonalis

Station 17. Grèce: N-W de Ægina (Sud d'Athènes) 37° 49′ N, 23° 27′ E.; 30 Décembre 1908, profondeur 55 mètres.

Lithothamnium fruticulosum var. clavulata
Litholh. Philippii
Litholh. calcareum
Lithophyllum Racemus
Lithoph. solutum.

Station 19. Grèce: Salamis (W. d'Athènes), 31 Décembre 1908, profondeur 6 à 8 mètres.

Lithothamnium Lenormandi.

II. Expédition du "Thor" de 1910.

Espèces recueillies par M. Ostenfeld.

Station 105. Espagne: Cap de Gate (province de Grenade), 24 Juin 1910, profondeur 15 à 20 mètres, n° 379.

Lithophyllum expansum
Melobesia farinosa
Melob. (Pliostroma) zonalis.

Station 142. Méditerranée, 35° 44′ N, 15° 07′ E. (Environs de l'île de Malte), 22 Juillet 1910, profondeur 98 mètres, n° 647, 648.

Lithothamnium Lenormandi
Lithoph. (Dermatolithon) hapalidioides.

Station 149. Tripolitaine: Grande Syrte, 26 Juillet 1910, profondeur 74 à 80 mètres, n° 404.

Lithothamnium Haucki
Lithophyllum expansum
Lithoph. solutum
Lithoph. (Dermatolithon) pustulatum.

Station 150. Même localité, 30° 23′ N, 19° 02′ E, profondeur 35 mètres, n° 417—418.

Lithophyllum solutum
Melobesia (Pliostroma) zonalis(?)

Station 153. Tripolitaine: Derna, 32° 45′ N, 22° 41′ E, 28 Juillet 1910, profondeur 13 mètres.

Lithothamnium Haucki
Lithophyllum expansum.

Station 165. Mer Egée: Ile Tenedos, 39° 48′ N, 25° 59′ E, 5 Août 1910, profondeur 35 mètres, n° 481 à 483.

Lithothamnium Philippii
Lithothamnium crispatum
Litholh. Haucki
Lithophyllum expansum
Lithophyllum solutum
Lithophyllum Racemus
Lithophyllum lichenoides
Lithoph. (Dermatolithon) hapalidioides
Melobesia (Pliostroma) zonalis
Peyssonnelia polymorpha.

Station 166. Même localité, profondeur 11 à 15 mètres, n° 484, 485.

Lithothamnium crispatum
Lithophyllum solutum
Lithophyllum Racemus
Lithoph. (Dermatolithon) hapalidioides.

Station 167. Même localité, n° 486 à 489.

Lithothamnium Lenormandi
Lithophyllum lichenoides
Melobesia (Pliostroma) zonalis.

Station 191. Sicile (E): Isola Bella près Taormine, 20 Août 1910, littoral, n° 492 à 500.

Lithothamnium Haucki
Lithothamnium subtenellum
Lithophyllum expansum
Lithophyllum lichenoides
Lithoph. (Dermatolithon) pustulatum
Tenarea tortuosa
Melobesia Lejolisi
Corallina mediterranea
Amphiroa rigida.

Station 201. Sardaigne S.E.: Pira sinus, 26 Août 1910, n° 559.

Lithophyllum (Dermatolithon) papillosum.

Station 207. Baléares: entre Majorque et Minorque, 39° 52′ N, 3° 41′ E, 28 Août 1910, profondeur 65 mètres, n° 578—579.

Lithothamnium calcareum
Lithophyllum expansum.

Station 221. Algérie: Andalusia sinus, près Oran, 35° 44′ N, 0° 53′ W, 4 Septembre 1910, profondeur 15 et 35 mètres, n° 590 à 594.

Lithothamnium Haucki
Lithothamnium calcareum var. squarrulosa
Lithophyllum expansum
Lithophyllum lichenoides.

France: côte atlantique: Brest, 19 Septembre 1910, n° 622.

Lithothamnium calcareum, var. crassa.

Les espèces d'algues calcaires récueillies par les deux expéditions du "Thor" dans la Méditerranée en 1908 et 1910, sont au nombre de 22: 19 Mélobésiées, 2 Corallinées, 1 Squamariacée.

Comme ces récoltes ont été faites dans de nombreuses stations de la Méditerranée, ces espèces représentent la majeure partie des espèces connues jusqu'ici dans la Méditerranée (en y comprenant l'Adriatique).

En ce qui concerne les Mélobésiées, on remarquera toutefois que les espèces suivantes, déjà signalées, n'ont pas été recueillies:

Archæolithothamnium mediterraneum Heyd.
Lithothamnium macroblastum Fosl.
Lithothamnium valens Fosl.
Lithothamnium polymorphum (L.) Aresch.
Epilithon membranaceum (Esp.) Heyd.
Choreonema Thureti (Born. Batt.) Schmitz
Lithophyllum (?) Notarisii (Dufour)
Lithophyllum decussatum (Ell. et Sol.) Phil.
Lithophyllum byssoides (Lmk.) Heyd.
Lithophyllum dentatum (Kütz.) Fosl.
Lithophyllum affine Fosl. et Howe.
Melobesia Solmsii Born. in herb.
Litholepis mediterranea Fosl.

La plupart de ces espèces n'ont été signalées qu'en des localités isolées et une seule fois: *L. macroblastum* dans le Golfe de Naples (Foslie 1897), *L. valens* dans la Mer Adriatique et l'île de Rhodes; *L. affine* en Grèce; *Litholepis mediterranea* à Banyuls, dans l'aquarium du Laboratoire. *L. byssoides* et *L. dentatum* sont plus connues et cependant leur absence dans les récoltes du "Thor" indique qu'elles ne sont pas très répandues. *L. decussatum* signalée en Sicile par Philippi n'a pas encore été retrouvée par les auteurs modernes.

Le *Archæolithothamnium mediterraneum* signalé par erreur à Naples[1], et recueilli en réalité à Ville-

[1] Cette espèce a en effet été signalée à Naples par de Toni, Mazza, Preda, qui n'ont fait que répéter l'indication de Heydrich, auteur de l'espèce. Or, d'après ce qu'a publié Foslie (A new squamariacea, 1905), relatant des renseignements reçus de J. Chalon, Heydrich avait été trompé sur la provenance des échantillons.

franche, ne paraît pas être une bonne espèce[1]; d'autre part *Epilithon membranaceum* et *Choreonema Thureti* sont de petites espèces épiphytes qu'on aurait peut être trouvées en examinant attentivement les algues non calcaires. *L. polymorphum* n'a encore été signalé qu'à Gênes et dans l'Adriatique.

Les récoltes du "Thor" ont un grand intérêt par l'indication très exacte qu'elles portent de la profondeur à laquelle elles ont été recueillies. En ce qui concerne les algues littorales, des fragments importants ont été recoltés et il a été possible de se rendre compte des espèces qui contribuent à la formation des "trottoirs"; on sait que le terme de "trottoirs" désigne des formations littorales dues en majeure partie aux algues calcaires et auxquelles contribuent des Annélides tubicoles et des Serpules; ces sortes de rebords plus ou moins épais servent d'abris à une foule de petits animaux. En Sicile, à Taormine, les trottoirs sont principalement constitués par le *Lithothamnium Haucki* dont les thalles se superposent les uns aux autres; ceux de la partie inférieure ne montrent plus aucune structure cellulaire et sont transformés en roche; souvent ces thalles sont traversés par des animaux, et la structure est tout à fait altérée, il semble y avoir désagrégation des membranes cellulaires des Algues calcaires.

Au *L. Haucki* sont associés *Corallina mediterranea, Lithophyllum incrustans, Tenarea tortuosa*; puis, jouant un rôle moins important, parce que leur croûtes sont minces, on peut aussi citer *Lithophyllum lichenoides* et *Lithoph. expansum* qui poussent sur les croûtes de *L. Haucki* et enfin *Amphiroa rigida*.

II. Les espèces recueillies par le "Thor".

A. Description des espèces.

LITHOTHAMNIUM CRISPATUM Hauck.

1883 *L. crispatum* Hauck, Meeresalg., p. 270, Pl. II, fig. 3.
1911 *L. crispatum* Hauck; Lemoine Mélob., p. 78, fig. 38. (non = *L. decussatum* Solms, Hauck et *L. Philippii* Foslie).

Mer Egée: Ile Tenedos, St. 165 et 166, nº 482 à 484, profondeur 11 et 35 mètres.

Les échantillons recueillis par le "Thor" ont l'aspect de petits thalles enroulés en forme de cornet cylindrique et correspondent tout à fait à la description que donne Hauck de son *L. crispatum*. L'aspect est frisé ou crispé, les thalles sont souvent surmontés de petites épines, surtout ceux qui croissent sur caillou.

Habitat et Répartition géographique.

Cette espèce n'a été jusqu'ici signalée qu'à Monaco, à Alger et dans l'Adriatique: à Orsero, Cherso et Brionic. Les échantillons de Tenedos ne diffèrent pas de ceux de Monaco.

LITHOTHAMNIUM PHILIPPII Foslie.

1905 *L. Philippii* Foslie, Lith. Adr. Meere, p. 13, Pl. I, fig. 1, non f. *crispata* Hauck. Synonymes: *L. decussatum* Solms, 1881, p. 14 et Hauck, 1883, p. 270, Pl. I, fig. 7.

Mer Egée: Ile Tenedos, Station 165, nº 483, 5 Août 1910, profondeur 35 mètres.
Grèce: NW. de Ægina, Station 17, 30 Décembre 1908, profondeur 55 mètres, avec *L. fruticulosum* et *L. Racemus*.

Suivant l'opinion de Foslie et n'ayant pas eu en mains suffisamment d'échantillons de cette espèce j'ai, en 1911, réuni à tort le *L. Philippii* (= *L. decussatum* Solms et Hauck) et le *L. crispatum* Hauck. L'aspect des échantillons bien développés ne permet pas de les considérer comme de simples variétés d'une même espèce et il faut noter dans la structure des différences importantes.

[1] Dans les échantillons nommés *Sporolithon mediterraneum* par Heydrich, Foslie aurait reconnu un mélange de six espèces.

Les échantillons de Ægina et de Tenedos forment des croûtes minces, libres à leur périphérie et n'adhérant jamais fortement à leur support (Pl. I, fig. 14). Quelques-uns ont même un aspect de feuille, étroite au point d'insertion, s'élargissant vers la périphérie où ils sont recourbés. Les feuilles sont parcourues par des stries ou même plutôt par des sortes de plis concentriques très marqués. Ces échantillons sont plus beaux et plus caractéristiques que ceux qui ont été figurés jusqu'ici.

Structure anatomique.

La croûte est constituée par un hypothalle qui est assez bien développé et par un périthalle qui peut acquérir une grande épaisseur.

Les files de cellules de l'hypothalle et du périthalle sont lâches et se recouvrent les unes les autres; celles du périthalle sont plus lâches que celles de l'hypothalle.

Les cellules de l'hypothalle mesurent 18 à 23 μ × 10 à 12 μ. Le périthalle est formé de cellules de forme régulièrement ovoïde, grandes, qui mesurent 17 à 28 μ × 13 à 19 μ, en particulier 23 × 13 à 14 μ. Dans le *L. crispatum* les cellules de l'hypothalle ont à peu près la même dimension, mais celles du périthalle sont beaucoup moins grandes: elles mesurent 15 à 20 μ de longueur et 6 à 9 μ de largeur, souvent 15 μ × 9 μ.

Dans le *L. Philippii* lorsque le périthalle prend un grand développement, il est interrompu par des couches d'écorces anciennes qui marquent les temps d'arrêt dans la croissance; on remarque que dans les préparations il y a fréquemment rupture du tissu suivant ces couches de cellules corticales.

En résumé l'espèce est caractérisée par ses files cellulaires lâches formées de cellules ovoïdes de dimension considérable par rapport aux autres espèces de Mélobésiées; il est en effet très rare que la dimension des cellules du périthalle dépasse 10 μ et à ce point de vue *L. Philippii* et *L. crispatum* se mettent tout à fait à part des autres espèces.

La structure qui vient d'être décrite a été observée dans les parties centrales des thalles, où les croûtes sont plus ou moins adhérentes au substratum. Mais vers la périphérie, là où les feuilles sont recourbées et libres, la structure est extrêmement simplifiée; l'hypothalle devient central, ainsi qu'il arrive souvent dans des croûtes libres, et par suite de la faible épaisseur du tissu il n'est plus constitué que par une seule file de cellules qui se ramifie vers la partie supérieure et la partie inférieure pour donner naissance à deux périthalles.

Répartition géographique.

L. Philippii a été signalé à Marseille, à l'Ile S^{te} Marguerite, en Corse, à Naples, en Sicile et dans la Mer Adriatique. Les localités de Ægina et de Tenedos sont donc tout à fait nouvelles.

LITHOTHAMNIUM LENORMANDI (Aresch.) Fosl.

Bibliographie: voir Lemoine, Mélobésiées, 1911, p. 81, fig. 26.

Grèce: Salamis, Station 19, 31 Décembre 1908, profondeur 6 à 8 mètres.
Mer Egée: Ile Tenedos, Station 167.
Méditerranée: Station 142, n° 647—648, 22 Juillet 1910, profondeur 98 mètres (Environs de l'Ile de Malte).

J'ai rapporté au *Lithothamnium Lenormandi* de petites croûtes très minces récoltées dans des draguages, et recueillies sur de petits cailloux. Le faible développement de ces croûtes rend la détermination difficile; dans les croûtes de la Station 142 le thalle n'avait qu'une épaisseur verticale de 35 μ; l'hypothalle n'était composé que de deux files de cellules; cependant, d'après la dimension des cellules, il est probable que ces croûtes, pourvues de stries concentriques, appartiennent au *L. Lenormandi*.

Répartition géographique.

L. Lenormandi a été signalé en diverses localités de la Méditerranée: en France, en Italie, en Sardaigne, en Algérie; dans la Mer Adriatique (Venise, Trieste, Rovigno); enfin elle avait été récoltée, à l'Ile des Serpents dans la Mer Noire. Elle était encore inconnue en Grèce, et dans la Mer Egée.

LITHOTHAMNIUM HAUCKI Rothpletz.

1883 *Lithothamnium mamillosum* Hauck (non Gümbel 1871) Meeresalgen, p. 272, Pl. III, fig. 3, Pl. V, fig. 1.
1891 *Litholh. Haucki* Rothpletz, Fossile Kalkalg., Zeitsch. D. geolog. Gesellsch., XLIII, p. 295.
1905 *Goniolithon mamillosum* Hauck; de Toni, Sylloge alg., p. 1798.
1905 *L. Brassica-Florida* Harv.; Foslie, Lith. Adr. Meere, p. 20 et 35, Pl. III, fig. 18 à 21.

Sicile: Taormine, 14 Décembre 1908, profondeur 3 à 16 mètres — Isola Bella près Taormine, Station 191, nº 497 à nº 500, 20 Août 1910, zone littorale.
Algérie: Andalusia sinus près Oran, Station 221, nº 594, 4 Septembre 1910, profondeur 35 mètres.
Tripolitaine: Grande Syrte, Station 149, no 404, 26 Juillet 1910, profondeur 74 à 80 mètres, sur coquille. — Derna, Station 153, nº 435—436, 28 Juillet 1910, profondeur 13 mètres.
Mer Egée: Ile Tenedos, Station 165, nº 481 à 483, 5 Août 1910, profondeur 35 mètres.

L. Haucki est l'une des espèces littorales de la Méditerranée et est par suite un actif constructeur des formations connues sous le nom de "trottoirs".

Il se présente, dans ces "trottoirs", sous l'aspect de croûtes de couleur grise légèrement rosée, qui poussent les unes sur les autres; la surface est légèrement mamelonnée et montre quelquefois de petites épines; la croûte est toujours adhérente et ne forme jamais de lames libres comme par exemple dans *Lithophyllum expansum*. L'aspect rappelle plutôt certaines formes de *Lithothamnium Philippii* Fosl. (var. *subdura*, Foslie 1905, Pl. I, fig. 2, 3.). Un échantillon recueilli par le "Thor" a été figuré Pl. I, fig. 15.

Foslie a, en 1905, réuni le *L. Haucki* avec le *L. Brassica-florida* de Harvey et le *M. mamillaris* Harvey; je préfère, ne connaissant que les échantillons méditerranéens, ne pas adopter cette manière de voir sans contrôle.

Structure anatomique.

L'hypothalle est peu développé; il est formé d'environ 5 à 6 files juxtaposées, très serrées; par ce caractère l'espèce appartient à la Section II des *Lithothamnium*, Les cellules sont courtes, rectangulaires, jamais ovoïdes; celles de la partie inférieure atteignent 30 μ; celles de la partie supérieure, au voisinage du périthalle mesurent 12 μ et même 9 μ. — Mais dans l'ensemble on peut dire que les cellules de l'hypothalle mesurent 15 à 28 μ $\times$ 3 à 7 μ, en général surtout 18 $\times$ 6 à 7.

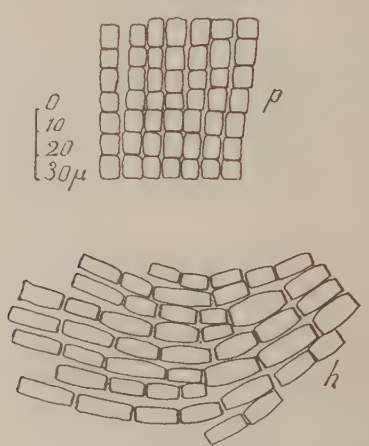


Fig. 1. Fragments d'une coupe verticale d'une croûte de *Lithothamnium Haucki*; *h.* hypothalle, *p.* périthalle. (Echantillon recueilli à Taormine, Sicile).

Dans les échantillons âgés, et dans la plupart des croûtes qui constituent les trottoirs, l'hypothalle a disparu.

Le périthalle est formé de petites cellules rectangulaires arrondies, de 7 à 12 μ de longueur et 5 à 7 μ de largeur, ayant fréquemment comme dimension 9 μ $\times$ 7 à 8 μ; à la partie inférieure elles sont disposées en files lâches et les cellules sont plus petites: 8 μ $\times$ 5 μ, ou au contraire elles atteignent 12 à 15 μ; mais vers la partie supérieure, elles constituent un tissu d'aspect très compact qui se colore toujours mal par les réactifs; quelquefois même les cellules se sont disposées en rangées; mais il est à remarquer qu'il n'existe pas de cloisons horizontales se colorant par les réactifs ainsi qu'on le voit dans les *Lithophyllum*.

Fréquemment dans cette espèce, les croûtes sont traversées par des animaux, dans ce cas la structure est très altérée; les cellules paraissent entourées d'une substance jaune produite sans doute par la désagrégation de la membrane.

Organes reproducteurs.

Des conceptacles visibles dans l'échantillon de Tenedos sont analogues à ceux décrits par Hauck; ils sont de grande taille, coniques et prolongés par une pointe

pourvue d'un orifice visible; ce sont les conceptacles à cystocarpes. D'autres conceptacles, hémisphériques, sont à peine surélevés au-dessus du thalle; ce sont sans doute des conceptacles à sporanges.

Comparaison avec les autres espèces.

L. Haucki a des analogies avec *L. polymorphum*. Les différences anatomiques qu'on peut noter sont les suivantes:

L'hypothalle est formé de cellules rectangulaires chez *L. Haucki*, tandis qu'il est formé de cellules rectangulaires-ovoïdes chez *L. polymorphum;* dans cette dernière espèce il est d'ailleurs beaucoup plus développé. La dimension des cellules est assez voisine mais non identique et l'accroissement en épaisseur se fait, chez les deux espèces, par répétition et superposition d'hypothalles et de périthalles. Le périthalle est constitué à la partie supérieure par des rangées dans *L. Haucki*, tandis qu'il est entièrement constitué par des files dans *L. polymorphum*.

Lorsque *L. Haucki, L. polymorphum* et *L. incrustans* sont fructifiés, on reconnait les deux dernières espèces à leurs conceptacles déprimés formant de petites cavités à la surface du thalle.

Répartition géographique.

L. Haucki n'est encore connu en France qu'à Banyuls; elle vit à Monaco (Herbier Bœrgesen); mais elle était inconnue en Italie et en Sicile; le "Thor" l'a recueillie pour la première fois sur la côte Est de Sicile à Taormine. *L. Haucki* a été signalé en Algérie (Bône, Stora, Alger) mais ne l'était pas encore à Oran ni en Tripolitaine où le "Thor" l'a recueillie à Derna et dans la Grande Syrte. Enfin cette espèce paraît abondante dans la Mer Adriatique, mais elle n'était pas connue dans la partie orientale de la Méditerranée où le "Thor" l'a recueillie à l'Ile Tenedos. En somme, les récoltes du "Thor" permettent d'étendre très largement la répartition de cette espèce, localisée à la Méditerranée, alors qu'elle paraissait, faute de renseignements, y être très peu abondante.

LITHOTHAMNIUM SUBTENELLUM (Fosl.) Lem. mscr.

1898 *Goniolithon subtenellum* Foslie, Some new or crit. Lith., p. 11.
1905 *Lithophyllum subtenellum* Fosl.; de Toni, Sylloge, p. 1795.
1909 *Lithophyllum subtenellum* Foslie, Alg. not., VI, p. 11.

Sicile: Isola Bella près Taormine, Station 191, n. 492 et 494, 20 Août 1910 (littoral).

Cette espèce se présente généralement sous l'aspect de croûtes roses, minces, se détachant assez facilement des cailloux sur lesquels elle est fixée; elles rappellent les croûtes jeunes de *L. expansum;* elles ne sont jamais déchiquetées sur les bords comme celles de *L. Lenormandi*, elles sont simplement lobées; leur contour est donc entier et elles sont épaissies sur les bords. La surface, tout à fait lisse lorsque l'algue est jeune, montre, à un stade plus avancé, des irrégularités et même des excroissances; ces excroissances peuvent même d'après M. Foslie atteindre 2 mm. de hauteur; elles sont, dit-il, généralement éparses, plus rarement nombreuses. Même dans les spécimens âgés il n'a pas observé de croûtes dépassant $^1/_2$ mm d'épaisseur. Un des échantillons recueillis par le "Thor" a été figuré Pl. I, fig. 12.

Structure anatomique.

Les croûtes jeunes que j'ai étudiées avaient une épaisseur de 60 à 120 μ seulement. Elles sont constituées principalement par un hypothalle formé de quelques files au nombre de 4 à 5 au maximum; ces files sont serrées et sont formées de cellules rectangulaires larges, à parois épaisses. Dans les échantillons bien développés, leur dimension est de 9 à 21 μ de longueur, souvent 14 à 16 μ, avec une largeur moyenne de 6 à 9 μ atteignant 13 μ. Les files de l'hypothalle sont souvent contournées sur elles-mêmes; leur trajet paraît être modifié par les inégalités du substratum. Quelquefois les coupes ne montrent que

les files supérieures de l'hypothalle, et dans ce cas les cellules ne dépassent pas 15 μ; la plupart ont comme dimensions 12 $\mu \times 7$ à 8 μ.

Dans la plupart des coupes l'hypothalle existe presque seul. Cependant dans les échantillons âgés le périthalle s'observe; d'après Foslie les cellules mesurent 7 à 14 $\mu \times 7$ à 10 μ, surtout 7 à 11 $\mu \times 7$ à 9 μ.

Organes reproducteurs.

Les conceptacles à sporanges sont petits (300 μ de diamètre) hémisphériques, souvent en grand nombre et très rapprochés.

D'après Foslie ils montreraient un pore principal central et 20 à 30 pores latéraux plus petits, assez difficiles à observer, paraît-il. Se basant sur la différence de taille des pores, Foslie avait placé cette espèce parmi les *Goniolithon*, puis parmi les *Lithophyllum*, dans lesquels il n'existe qu'un pore unique. Mais on peut tout aussi bien la considérer comme un *Lithothamnium* dans lequel l'un des pores prendrait une place prépondérante; comme sa structure est celle de *Lithothamnium* je n'hésite pas à adopter cette manière de voir. Il serait intéressant de voir si les loges qui correspondent à ces pores, dans les conceptacles de *Lithothamnium* existent également dans les conceptacles de *L. subtenellum*. Quelle que soit la structure intime des conceptacles, cette espèce apparaît comme un type de transition entre les deux principaux types de conceptacles à sporanges: ceux des *Lithothamnium* et ceux des *Lithophyllum*.

D'après Foslie les sporanges mesurent 75 μ de longueur et 40 μ de largeur.

Les conceptacles à cystocarpes sont plus coniques que les précédents; mais ils seraient d'après Foslie de même taille que les conceptacles à sporanges.

Cette espèce se trouve fréquemment sur les mêmes pierres que *L. Lenormandi*, *L. Sonderi*, et *L. incrustans*; elle recouvre souvent les deux premières espèces et est recouverte par la dernière.

Répartition géographique.

Cette espèce n'a encore été signalée qu'en un petit nombre de stations: France: Banyuls, Marseille (Joleaud), Antibes (Herbier Thuret-Bornet); Algérie (Debray). Elle était absolument inconnue sur les autres côtes méditerranéennes et en particulier en Sicile à Taormine où elle a été recueillie par le "Thor".

LITHOTHAMNIUM CALCAREUM (Pall.) Aresch.

Bibliographie: voir Lemoine, Mélobésiées, 1911, p. 102, Pl. I, fig. 3 à 5.

Atlantique: Brest, n. 622, 19 Septembre 1910, var. *crassa*.
Baléares: entre Majorque et Minorque, Station 207, n. 579, 28 Août 1910, profondeur 65 mètres.
Algérie: Andalusia sinus près Oran, Station 221, n. 594, 4 Septembre 1910, profondeur 35 mètres, var. *squarrulosa*.
Grece: N-W. de Ægina, Station 17, 30 Décembre 1908, profondeur 55 mètres.

On sait que *L. calcareum* est une des espèces les plus variables de Mélobésiées; les échantillons recueillis rentrent dans les variétés *squarrulosa* Fosl. et *crassa* (Phil.) Lem. Les échantillons sont reconnaissables, au point de vue anatomique, à leurs petites cellules ovoïdes, de forme un peu irrégulière, disposées en files lâches; la dimension des cellules est en général 10 μ, ça et là elles atteignent 13 μ de longueur.

Répartition géographique.

La répartition du *L. calcareum* sera indiquée page 24.

Elle est abondante dans l'Atlantique. La localité de Brest (Finistère), mentionnée plus haut, n'est pas nouvelle: des échantillons de cette localité existent dans l'Herbier du Museum et dans l'Herbier Thuret-Bornet.

En Méditerranée elle était connue en Italie á Naples et en quelques points des côtes françaises (Banyuls, Marseille, Toulon, Giens, le Pradet), mais elle n'avait pas encore été recueillie aux Baléares.

En Algérie, on ne la connaissait qu'à Alger; on sait à présent qu'elle vit aussi à Oran. Enfin sa limite vers l'Est paraissait être la Mer Adriatique (S[t] Andrea); la découverte de cette espèce en Grèce est intéressante.

LITHOTHAMNIUM FRUTICULOSUM (Kütz.) Fosl.

1841 *Spongites fruticulosa* Kutzing, Polyp. calcif., p. 33.
1858 *Sp. fruticulosa* Kutzing, Tab. Phyc., XIX, pl. 99, d.
1883 *Lithothamnium fasciculatum* et var. *fruticulosum* Kutz.; Hauck, Meeresalg., p. 270, pl. III, fig. 10, 11, pl. V, fig. 3 à 5.
1901 *Lith. fruticulosum* Kutz.; Foslie, Flora Koh Chang, p. 17.
1903 *Lith. fruticulosum* Kutz.; Foslie, Maldive Lacc., p. 464, pl. XXIV, fig. 2, 3.
1905 *Lith. fruticulosum* Kutz.; Foslie, die Lith. Adr. Meere, p. 7 et 31, pl. I, fig. 4 à 17, pl. III, fig. 8 à 15 (non f. *soluta*).

Synonymes: *L. ramulosum* Philippi, 1837, p. 388. *Lith. Meneghianum* Vinassa, 1892, p. 57.

Grèce: N-W. de Ægina, Station 17, 30 Décembre 1908, profondeur 55 mètres.

Aspect extérieur.

Cette espèce est représentée dans les récoltes du Thor par des croûtes minces fixées sur des cailloux, d'où s'élèvent de très nombreuses petites branches très fines, semblables à des épines cylindriques; dans quelques échantillons la croûte, surmontrée d'épines entoure complètement le caillou qui sert de support, dont l'aspect est ainsi tout à fait hérissé.

Des thalles analogues ont été signalés dans l'Adriatique et en Méditerranée, dans le Golfe de Siam et la mer Egée et rangés par Foslie dans la variété *clavulata*.

Les échantillons de *L. fruticulosum* ont été rangés par M. Foslie dans trois variétés.

1) *var. clavulata*; cette variété groupe les échantillons dont les branches ont 1^{mm} à $1^{mm,5}$ de diamètre; ce sont par exemple les échantillons figurés par Kutzing (pl. 99), par Hauck (Pl. V, fig. 5) exemplaire âgé, par Foslie (1905, Pl. I, fig. 10 à 17, Pl. III, fig. 9 à 14).
2) *var. crassiuscula* pour les échantillons dont les branches ont 2^{mm} à $2^{mm,5}$ de diamètre et dont l'aspect est ainsi plus grossier que dans la variété *clavulata*. Foslie range dans cette variété les échantillons figurés par Hauck (pl. III, fig. 11), par Foslie (1905, pl. I, fig. 4 à 9, pl. III, fig. 8 et 15; 1903, pl. XXIV, fig. 2).
3) var *Kuetzingi* (Foslie Algol. not. IV, 1907, p. 21). A cette forme appartiendrait l'échantillon figuré par Hauck (Pl. V, fig. 3).

Une autre variété, *v. occidentale*, des Antilles a été ensuite considérée par Foslie comme une espèce distincte sous le nom de *Lithothamnium occidentale*.

D'après Foslie tous les intermédiaires existent entre les variétés *clavulata* et *crassiuscula*.

Structure anatomique.

En coupe, on remarque que la croûte basilaire d'où s'élèvent les branches, est constituée principalement par le périthalle; c'est ce tissu qui augmente d'épaisseur par constituer les branches. A la partie tout à fait inférieure on remarque l'existence de l'hypothalle, très peu développé, formé seulement de quelques files de cellules et quelquefois fragmentaire; ces cellules sont rectangulaires et mesurent 10 à $18\mu \times 4$ à 7μ.

Les périthalle est formé de cellules ovoïdes rappelant celles du *L. calcareum* et réunies les unes aux autres dans la longueur d'une même file par une partie rétrécie.

Organes reproducteurs.

Les conceptacles ont été signalés par Foslie (1905). Les conceptacles à sporanges sont surbaissés et confluents, en petits groupes ou isolés; les conceptacles à cystocarpes sont coniques; les deux sortes de conceptacles ont la même dimension 450 à 700μ de diamètre. Les sporanges (tétraspores) mesurent $150\mu \times 40$ à 50μ (Foslie 1901). Les conceptacles à anthéridies sont subconiques et mesurent 200 à 300μ.

Répartition géographique.

Cette espèce est connue en France à Marseille (Lemoine mscr. var. *crassiuscula*); en Italie à Naples, et en Sicile; dans l'Adriatique (six localités); en Tripolitaine à Homs et en Algérie à Bône et à Stora; enfin dans la Méditerranée orientale à l'Ile Nisyros (Foslie 1905).

TENAREA TORTUOSA (Esper) Lemoine.

Bibliographie: voir Lemoine, Mélobésiées, 1911, p. 169, fig. 97 à 99, Pl. V, fig. 4.

Sicile: Taormine, Janvier 1908, profondeur 3 à 16 mètres.
Isola Bella, près Taormine, Station 191, n. 499—500, 20 Août 1910.

T. tortuosa est l'espèce la plus commune de la Méditerranée; c'est aussi, une des espèces qu'on peut récolter sans draguage.

Cette espèce se présente toujours en coussinets formés de lamelles verticales; la largeur des lamelles est très variable et quelquefois même elles sont remplacées par des épines. Les échantillons de Taormine ne sont pas tous semblables, ceux de Isola Bella sont formés de lamelles beaucoup plus serrées. — L'un des échantillons de Taormine montre, sur ses bords, des lamelles presque horizontales; Hauck a figuré un échantillon analogue (Pl. II, fig. 5).

Répartition géographique.

La répartition de cette espèce en dehors de la Méditerranée, dans la région atlantique avoisinant la Méditerranée, sera donnée page 23.

Sur les côtes méditerranéennes, elle a été signalée aux Baléares; en diverses localités de France et de la côte ouest de l'Italie de Gênes à Naples; en Corse à Ajaccio (Herbier Bœrgesen); elle a été signalée dans l'Adriatique, en Grèce au Cap Tenare et en Algérie, à Alger.

En Sicile elle a été signalée à Trapani, sur la côte ouest, par Langenbach en 1873 et à Jonio par Ardissone (sous le nom de *M. cristata*, en 1886). La localité de Taormine, sur la côte Est de Sicile, indiquée par les récoltes du "Thor" est donc tout à fait nouvelle.

LITHOPHYLLUM INCRUSTANS Philippi.

Bibliographie: voir Lemoine, Mélobésiées, 1911, p. 121, fig. 57, 58, Pl. IV, fig. 1.

Sicile: Taormine, 14 Décembre 1908, profondeur 3 à 16 m.

Cette espèce ne figure dans les récoltes du "Thor" que par un seul échantillon; *L. incrustans* est une espèce littorale et il est à remarquer que la plupart des récoltes du Thor ont été faites par draguages.

L. incrustans vivait à Taormine en compagnie de *L. Haucki, L. lichenoides.* L'aspect de cet échantillon est assez analogue à celui de *L. Haucki;* mais les croûtes de *L. incrustans* sont plus irrégulières et sont pourvues de sortes de crêtes; la couleur est gris-violacée tandis que celle de *L. Haucki* est plutôt rose-saumon; de plus la surface est, dans *L. incrustans,* parsemée de petites dépressions qui correspondent aux conceptacles.

En coupe, lorsque l'espèce est jeune, elle montre un hypothalle, formé de rangées concentriques caractéristiques; mais ici l'hypothalle est détruit; on constate seulement, à la base du périthalle la présence de rangées horizontales de grandes cellules de 20 à 30 μ qui représentent l'hypothalle secondaire.

Le périthalle proprement dit est formé de files lâches de petites cellules de 9 à 12 $\mu \times 7$ à 8 μ; elles peuvent même atteindre 14 μ.

Répartition géographique.

La répartition de cette espèce dans l'Atlantique est indiquée page 24.

Dans la Méditerranée elle est connue en quelques points des côtes françaises: Banyuls, Marseille, Antibes, Ile St. Honorat; en Italie: à Portofino et à Naples; dans l'Adriatique; en Algérie. En Sicile elle avait été signalée par Philippi en 1837 sans indication de localité; il est très intéressant que l'Expédition du "Thor" ait, la première depuis Philippi, retrouvé cette espèce en Sicile. Enfin cette espèce vit également à l'Ile d'Alboran et en Espagne à Malaga.

LITHOPHYLLUM LICHENOIDES (Ellis) Philippi.

Bibliographie: voir Lemoine, Mélobésiées, 1911, p. 127, fig. 59 à 61.

Sicile: Isola Bella près Taormine, Station 191, n. 498 à 500, 20 Août 1910 (sur pierres et contribuant à la formation des "trottoirs").
Mer Egée: Ile Tenedos, Station 165 et 167, n. 483 et 486, 5 Août 1910 (zone littorale, sur Serpules).
Algérie: Andalusia sinus près Oran, Station 221, n. 591, 4 Septembre 1910, profondeur 15 mètres.

Lithophyllum lichenoides a été recueilli en plusieurs localités de la Méditerranée par le "Thor"; les échantillons ne sont pas très typiques: ils se présentent sous l'aspect de croûtes recouvrant les cailloux (Pl. I, fig. 11) ou des tubes de Serpules; ils ne constituent pas des massifs formés de feuilles diversement disposées, ce qui est la disposition caractéristique de l'espèce.

Dans ces échantillons formant des croûtes, les unes ont une surface brillante, parcourue par des lignes concentriques apparentes; ces deux caractères se trouvent fréquemment dans le *L. lichenoides*; d'autres échantillons ont au contraire une surface terne et grisâtre et la structure est alors un indice précieux pour ranger ces échantillons dans cette espèce.

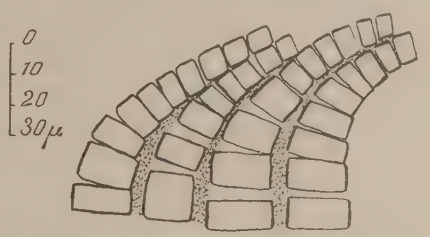


Fig. 2. Fragment d'une coupe d'un échantillon âgé de *Lithophyllum lichenoides* de l'Ile Tenedos; l'hypothalle est en partie disparu il ne reste que la moitié supérieure des rangées qui le constituent.

L'étude de la structure montre que ces échantillons grisâtres sont des individus déjà âgés (Andalusia sinus et Ile Tenedos); le premier tissu, l'hypothalle est déjà en partie disparu (fig. 2), et le périthalle a acquis un grand développement (jusqu'à 200 μ d'épaisseur). D'autres échantillons, à surface brillante (Andalusia sinus), sont jeunes et ne sont encore constitués que par l'hypothalle.

Dans tous ces échantillons les cellules de l'hypothalle mesurent 20 à 30 μ de longueur et 7 à 10 μ ou même 10 à 12 μ de largeur; les cellules du périthalle, dans les échantillons où ce tissu existe, mesurent 8 à 10 μ $\times$ 4 à 5 μ; elles sont rectangulaires, toutes semblables, disposées en files distinctes.

Répartition géographique.

Dans la Méditerranée cette espèce est connue aux Baléares, en différents points des côtes de France; elle est inconnue sur les côtes de l'Italie proprement dite et de l'Adriatique. Elle a été signalée en Sicile par Philippi sans indication de localité; l'expédition du "Thor" l'a récoltée à Taormine sur la côte Est de Sicile. En Algérie elle était connue à Alger et à la Calle; le "Thor" l'a recueillie de plus à Oran, où l'espèce n'était pas encore connue. Enfin *L. lichenoides* a été signalé en Cyrénaique et l'Ile de Rhodes. On pouvait penser d'après son absence en Adriatique et en Grèce que l'espèce était rare ou absente dans la Méditerranée orientale. Il n'en est rien puisque le "Thor" l'a recueillie à l'Ile Tenedos, près des Dardanelles; il est probable qu'on retrouvera également l'espèce en Grèce. En résumé le "Thor" a fourni pour cette espèce trois localités nouvelles très intéressantes.

LITHOPHYLLUM SOLUTUM (Foslie) Lemoine.

1905 *Lithothamnium fruticulosum* f. *soluta* Foslie, Lith. Adr. Meere, p. 7, Pl. I, fig. 18 à 33.
1906 *Lithothamnium solutum* Foslie, Alg. not. II, p. 14, f. *effusa* Fosl.
1908 *Litholh. solutum* Foslie, Lith. Deutsch. sudp. Exped., p. 214. (= *Lith. coralloides* f. *minuta* Foslie, Some new or crit. Lith., p. 7).

Tripolitaine: Grande Syrte, Station 149, n. 404, 26 Juillet 1910, profondeur 74 à 80 mètres — idem Station 150, n. 418, profondeur 35 mètres.
Grèce: N-W. de Ægina, Station 17, 30 Décembre 1908, profondeur 55 mètres.
Mer Egée: Ile Tenedos, Station 165, n. 482 et 483, 5 Août 1910, profondeur 35 mètres — idem Station 166, n. 484, 485, profondeur 11 à 15 mètres,

Lithophyllum solutum est une espèce encore insuffisamment décrite; elle a d'abord été considérée comme une forme du *Lithothamnium calcareum* (*L. coralloides* f. *minuta*) puis du *Litholh. fruticulosum*; d'après l'auteur, elle avait avec le *L. fruticulosum* des caractères communs en particulier la structure et les organes reproducteurs; en réalité ces organes (Foslie 1908) se rencontrent rarement et l'espèce est généralement stérile; quant à la structure, elle me paraît suffisamment caractérisée pour motiver la conservation de l'espèce *L. solutum*; l'aspect est très typique et l'espèce paraît peu variable, elle ne montre d'analogie, lorsqu'elle n'est pas ramifiée, qu'avec la variété *subsimplex* du *Lithothamnium calcareum*.

Aspect extérieur.

L. solutum se présente sous l'aspect de petits thalles formés de tiges fines, ramifiées seulement une ou deux fois, de 1 cm 1/2 de longueur au plus (Pl. I, fig. 9); ces thalles rappellent, au point de vue de leur ramification, *L. calcareum* var. *subvalida* mais ils sont beaucoup plus fins. Jeune *L. solutum* débute par la formation de croûtes très minces sur les cailloux; sur ces croûtes apparaissant rapidement de petites pointes, puis de petites branches.

Etude anatomique.

En coupe le tissu se montre composé de cellules de 13 à 20 μ de longueur, fréquemment de 13 à 17 μ et de 8 à 12 μ de largeur; elles sont à peu près une fois et demi plus longues que larges; leurs parois sont épaisses et paraissent dépourvues de pores. Ces cellules sont disposées en rangées dans toute l'étendue du tissu; mais en certains points les différentes files cellulaires restent distinctes (fig. 3) et les cellules ont une forme rectangulaire ovoïde; tandis qu'en d'autres points les files sont très serrées, la disposition en rangées est pleinement réalisée et les différentes rangées sont séparées par des cloisons horizontales qui se colorent fortement par les réactifs.

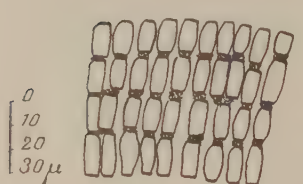


Fig. 3. Aspect des cellules de *Lithophyllum solutum*. (Echantillon de l'Ile Tenedos, Station 165).

Répartition géographique.

Dans la Méditerranée cette espèce est connue à Monaco (Herbier du Museum); en Corse, à Bastia; en Tunisie, à Sfax; en Italie, à Naples; dans l'Adriatique (Iles Brionic). Dans la Méditerranée orientale, elle n'avait été recueillie qu'à l'île Nisyros (Foslie 1908) au Nord Ouest de l'île de Rhodes. Les localités de Ægina en Grèce et de Tenedos dans la Mer Egée sont nouvelles. De même c'est la première fois que l'espèce est recueillie en Tripolitaine (Grande Syrte).

LITHOPHYLLUM EXPANSUM Philippi.

Bibliographie: voir Lemoine, Mélobésiées, 1911, p. 176, fig. 101, Pl. V, fig. 1.

Espagne: Cap de Gata, Station 105, nº 379, profondeur 15 à 20 mètres, 24 Juin 1910 (fructifié).
Baléares: entre Majorque et Minorque, Station 207, n. 578, 579, profondeur 65 mètres, 28 Août 1910.
Algérie: Andalusia sinus près Oran, Station 221, n. 591 à 593, profondeur 15 et 35 mètres, 4 Septembre 1910 (fructifié). (*L. expansum* type et var. *tenuis*).
Sicile: Isola Bella près Taormine, Station 191, n. 498 à 500, 20 Août 1910 (fructifié). — Taormine, 14 Décembre 1908 profondeur 3 à 16 mètres, sur Bénitier et libre.
Tripolitaine: Grande Syrte, Station 149, nº 404, 26 Juillet 1910, profondeur 74 à 80 mètres (var. *tenuis*). Derna, Station 153, nº 435, 436, 28 Juillet 1910, profondeur 13 mètres.
Mer Egée: Ile Tenedos, Station 165, nº 482, 483, 5 Août 1910, profondeur 35 mètres.

Aspect extérieur.

Lithophyllum expansum a été recueillie plusieurs fois par le "Thor" dans la Méditerranée sous des formes assez différentes. En Sicile, à Isola Bella près Taormine (Pl. I, fig. 2), aux Baléares, à Oran

(Pl. I, fig. 3 et 4) il a été récolté des croûtes presque planes, d'une épaisseur très uniforme, très cassantes, qui étaient séparées de leur substratum. D'autres au contraire, récoltées à Taormine, sont formées de lamelles plus ou moins contournées en cornet ou encore de lamelles mamelonnées poussant les unes au-dessus des autres (Pl. I, fig. 1); cet aspect est fréquent dans les échantillons de *L. expansum*.

Une variété très intéressante que je désignerai sous le nom de var. *tenuis* a été recueillie à Oran en Algérie (St. 221) (Pl. I, fig. 5 et 6) et en Tripolitaine (Station 149) (Pl. I, fig. 7). Elle se présente sous l'aspect de petits thalles minces, de forme orbiculaire, de très petite taille, ou en forme de chapeau bombé; quelques uns ont été recueillis libres, d'autres sont fixés à des tiges ou à l'extrémité des fibres de *Posidonia* (fig. 7); l'aspect curieux et élégant de cette variété rappelle celui de certains petits champignons comme les *Crepidotus*. Sans l'indice certain de détermination que fournit l'étude de la structure, on serait fort embarrassé pour nommer ces échantillons de si petite taille.

Etude anatomique.

Dans les échantillons normaux de cette espèce recueillis par le "Thor" les caractères anatomiques n'offrent aucune particularité; l'hypothalle se colore mal ou même pas du tout par les réactifs. Le périthalle est formé de files lâches, rigides, dont les cellules se colorent très fortement par les réactifs; ces cellules mesurent 12 à 18 μ de longueur et 9 à 11 μ de largeur; des dimensions fréquentes sont 13 à 14 $\mu \times 9\,\mu$ et 16 $\mu \times 9\,\mu$.

Les petits thalles appartenant à la variété *tenuis* qui poussent sur *Posidonia* montrent une épaisseur très faible 85 à 90 μ et par suite un nombre de cellules restreint; en effet le thalle n'est guère constitué que par 8 ou 9 cellules superposées, et même vers la périphérie, où le thalle va en s'amincissant, il n'est plus formé que par 2 à 3 cellules. A cette diminution dans le nombre des cellules correspond une diminution de taille: elles mesurent 7 à 11 $\mu \times 7\,\mu$ ou 7 à 8 $\mu \times 10\,\mu$: c'est la plus faible dimension qui ait été constatée jusqu'ici pour cette espèce.

Répartition géographique.

Lithophyllum expansum est l'espèce caractéristique de la région méditerranéenne où on le rencontre dans de nombreuses localités; la détermination des récoltes du "Thor" me permet cependant de signaler un certain nombre de localités nouvelles.

L. expansum est pour la première fois signalé sur les côtes d'Espagne au Cap de Gate. Par contre il était déjà connu aux Baléares où le "Thor" l'a aussi recueilli. En France l'espèce est connue en plusieurs localités, ainsi qu'en Italie de Gênes à Naples. En Sicile on connaissait son existence, mais sans indication de localité précise; le "Thor" l'a recueilli sur la côte est, à Taormine. *L. expansum* était connu en Algérie à Alger à Bône et à la Calle; il n'était pas encore connu à Oran où le "Thor" l'a recueilli. Enfin c'est la première fois que l'espèce est signalée en Tripolitaine (Grande Syrte et Derna) et dans la Mer Egée (Ile Tenedos). Elle n'était pas connue au-delà de la Mer Adriatique dans la partie orientale de la Méditerranée.

En résumé *L. expansum* est connu, d'après les déterminations du présent travail dans trois régions nouvelles: Espagne, Tripolitaine, Mer Egée et dans deux localités nouvelles: Taormine et Oran.

LITHOPHYLLUM RACEMUS (Lmk.) Fosl.

1818 *Millepora Racemus* Lamarck, Hist. anim. sans vertèbres II, p. 203.
1883 *Lithothamnium crassum* Hauck, Meeresalgen, p. 273, Pl. I, fig. 1 à 3.
1905 *Lithophyllum Racemus* Lmk.; de Toni, Sylloge alg., p. 1778 (non *L. racemus* Crouan, Florule Finistère, p. 150; non Châlon Liste algues, p. 206, non *L. crassum* Philippi, Kützing, non forma *Kaiseri*).

Grèce: N-W. de Ægina, Station 17, 30 Décembre 1908, profondeur 55 mètres.
Mer Egée: Ile Tenedos, Station 165, nº 482, 483, 5 Août 1910, profondeur 35 mètres; Station 166, n. 484, 5 Août 1910, profondeur 11 à 15 mètres.

Malgré la grande abondance de cette espèce dans la Méditerranée, sa détermination est assez difficile par le manque d'échantillons dans les collections et l'absence totale de descriptions détaillées concernant cette espèce. C'est pourquoi je crois utile de décrire cette espèce d'une façon aussi complète que possible.

Bibliographie.

Le seul auteur qui ait décrit et figuré le *L. Racemus* est Hauck; il l'a décrite sous le nom de *L. crassum* Philippi, mais, à mon avis, le *L. crassum* de Philippi et de Kützing se rapporte plutôt au *L. calcareum*. Il est probable que l'espèce décrite par Hauck sous le nom de *L. crassum* se rapporte à celle que Philippi et Kuetzing ont, après Lamarck, désignée sous le nom de *Racemus*. Cependant les diagnoses de ces auteurs anciens sont si incomplètes et les figures si mauvaises qu'il est toujours délicat en ces circonstances d'être très affirmatif.

Aspect extérieur.

Les échantillons recueillis par le "Thor" (Pl. I, fig. 10) sont typiques quoique de petite taille; ils ressemblent beaucoup à ceux de la Collection Thuret-Bornet, provenant les uns de Rovigno dans la Mer Adriatique (*L. crassum*, leg. Hauck 1878), et les autres de la Secca della Gajola dans la Baie de Naples (leg. Solms 1880).

Les échantillons de Grèce forment de petits massifs libres dans lesquels les branches sont surtout développées dans un seul sens; la plupart paraissent avoir reposé sur le sol par la face opposée; au contraire dans d'autres cas (description de Hauck, échantillons Thuret-Bornet, échantillons de Marseille etc) *L. Racemus* constitue des boules arrondies. — Les échantillons de Tenedos ont 1 cm de diamètre tandis que ceux de Ægina atteignent 2 cm; la grosseur paraît d'ailleurs très variable: Foslie a décrit de la Mer Adriatique des échantillons de la grosseur d'une noix tandis que d'après Hauck on en trouverait de la grosseur du poing. Des échantillons de Marseille de ma collection ont jusqu'à 5 cm; or ils ont été recueillis à la même profondeur que ceux de Ægina.

Les branches qui constituent ce petit massif sont cylindriques mais très contournées et se ramifiant; les dernières ramifications s'aplatissent et dans certains échantillons elles arrivent à se toucher. La couleur est généralement gris-violacé.

Structure anatomique.

En coupe le tissu est constitué par des files cellulaires d'aspect rigide, serrées les unes contre les autres, mais se séparant facilement par la pression de la lamelle couvre-objet; les cellules ont des contours très nets et se colorent bien par les réactifs; les cellules sont rectangulaires; elles mesurent 13 à 22 μ de longueur et 6 à 10 μ de largeur, fréquemment 18 $\mu \times$ 10 μ. Les cellules sont généralement au même niveau dans les différentes files, mais les cloisons horizontales ne s'organisent jamais en lignes continues concentriques comme dans les espèces typiques du genre *Lithophyllum*. On observe très fréquemment dans cette espèce les pores dans les cellules et les canaux qui font communiquer les cellules des différentes files cellulaires entre elles.

A l'état jeune l'espèce forme d'abord une croûte sur laquelle apparaissent rapidement de jeunes branches; une coupe de cette croûte montre un tissu analogue à celui des branches formé de files distinctes de cellules; les cellules sont cependant plus petites et mesurent 8 à 11 $\mu \times$ 7 à 9 μ. A la base de ce tissu périthallien est l'hypothalle, formé d'une seule rangée de cellules courtes. En certaines coupes on remarque qu'entre l'hypothalle et le périthalle tels qu'ils viennent d'être décrits, s'intercale un périthalle primaire formé de cellules disposées en rangées; ce caractère fugitif est intéressant à considérer au point de vue de la position systématique de l'espèce et de ses relations avec les autres espèces du genre.

Organes reproducteurs.

Ces organes n'ont jamais été décrits en détail. Hauck et Foslie indiquent seulement que les conceptacles sont groupés à l'extrémité des branches et à peine surélevés au-dessus de la surface du tissu. Cette espèce paraît être d'ailleurs presque constamment stérile et je n'ai pas observé ces conceptacles.

Répartition géographique.

L. racemus paraît être une espèce très caractéristique de la flore méditerranéenne. Il n'est encore connu qu'en une seule localité française, à Marseille (Bouches-du-Rhône), d'où j'ai eu l'occasion de la signaler récemment d'après les récoltes de M. A. et L. Joleaud. Il vit aussi en Corse, à Bastia, à Naples, en Sicile, en Algérie, en Tunisie, à Sfax, en Tripolitaine, dans l'Adriatique.

Les localités de Ægina, en Grèce, et de l'Ile Tenedos sont tout à fait nouvelles.

D'autre part M. Foslie a montré la parenté qui existe entre le *L. racemus* et le *L. Andrussowi*: si l'identité de ces deux espèces était établie, l'aire de répartition du *L. racemus* s'étendrait aux Dardanelles et à la Mer de Marmara.

En dehors de la Méditerranée *L. racemus* se trouve dans le Golfe de Siam.

Au point de vue de la profondeur à laquelle il vit, il a été signalé par Hauck à une profondeur de 10 à 50 mètres dans la Mer Adriatique; à Marseille il vit entre 40 et 60 mètres; en Grèce et dans la Mer Egée il a été recueilli d'une part entre 11 et 35 mètres, d'autre part à 55 mètres.

LITHOPHYLLUM (DERMATOLITHON) PUSTULATUM (Lmx.) Fosl.

Bibliographie: voir Lemoine, Mélobésiées Ouest de l'Irlande, 1913, p. 138, fig. 5 et 6.

Sicile: Taormine, 14 Décembre 1908, profondeur 3 à 16 mètres, sur Posidonia — Isola Bella près Taormine, Station 191, n. 495—500, 20 Août 1910, sur algues.

Tripolitaine: Grande Syrte, Station 149, n. 404, 26 Juillet 1910, profondeur 74 à 80 mètres, sur tige.

Cette espèce constitue, dans les échantillons de Sicile, des croûtes fixées sur la tige et sur les rameaux de *Posidonia*. Les croûtes des filaments des rameaux sont forcément de très petite taille, elles sont mamelonnées et relativement épaisses. En coupe on constate qu'elles sont composées de 7 rangées de cellules, dont l'hypothalle (1 rangée), 5 rangées périthalliennes et l'écorce. Les cellules hypothalliennes mesurent 35 à 40 μ; elles montrent la forme contournée caractéristique des *Dermatolithon*; les cellules périthalliennes sont rectangulaires avec des pores bien visibles; elles mesurent 12 à 20 μ suivant les rangées considérées (fig. 4).

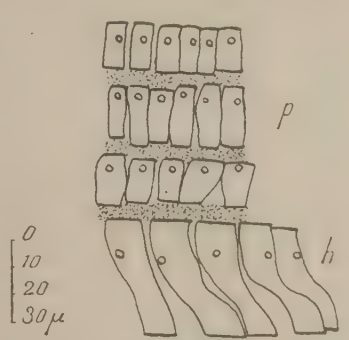


Fig. 4. Aspect d'une coupe verticale des thalles de *Lithophyllum pustulatum* formant de petites croûtes à l'extrémité des fibres de *Posidonia*. (Echantillon de Taormine, Sicile); *h.* hypothalle, *p.* périthalle.

Sur la tige principale, la même espèce forme des croûtes de plus grande taille, également mamelonnées et pourvues de conceptacles à sporanges larges, hémisphériques, peu élevés. En coupe ces croûtes sont constituées par 3 à 5 rangées de cellules, dont l'hypothalle, 1 à 3 rangées périthalliennes, et l'écorce. Les cellules périthalliennes mesurent 25 à 40 μ suivant les rangées et montrent de petits pores. Un conceptacle a montré, en coupe, des bispores de 75 $\mu \times 40\,\mu$.

L'échantillon de Tripolitaine fixé sur tige forme une croûte très mince, entourant le support, et constituée presque uniquement par l'hypothalle dont les cellules n'ont pas la forme contournée caractéristique qu'elles ont au contraire dans les échantillons de Sicile; ces cellules sont simplement obliques, et presque carrées sur les bords; la croûte porte de gros conceptacles larges, peu élevés, surmontés d'une pointe. J'ai déjà, en 1913, pour cette même espèce attiré l'attention sur cette modification de forme qui se produit assez souvent pour les cellules de l'hypothalle sans que la cause en apparaisse bien nettement.

Répartition géographique.

L. pustulatum a été signalé aux Baléares, sur la côte française et sur la côte italienne jusqu'à Naples; elle est connue également à l'île d'Elbe, en Sardaigne et en Sicile; en Sicile elle a été signalée à Palerme, Trapani et Amendolara et ne l'avait pas encore été à Taormine; mais, d'après Ardissone elle serait abondante dans toute la Sicile. Elle a également été recueillie dans la mer de Sicile, à Lampedusa, à l'Ile de Malte; dans la Mer Adriatique: Venise et Ancone; à l'île de Rhodes; en Egypte à Alexandrie; en Tripolitaine à Tripoli; en Cyrénaïque à Tobrouk; en Algérie à Alger et à Oran; la localité de la Grande Syrte signalée par le "Thor" est nouvelle.

LITHOPHYLLUM (DERMATOLITHON) HAPALIDIOIDES (Cr.) Fosl.

Bibliographie: voir Lemoine, Mélob. Ouest Irlande, 1913, p. 135, fig. 3 et 4.

Méditerranée: Station 142, nº 648, 22 Juillet 1910, profondeur 98 mètres (Parages de l'Ile de Malte), 35° 44′ latitude N, 15° 07′ long. E.

Mer Egée: Ile Tenedos, Station 165, nº 481, 482, 5 Août 1910, profondeur 35 mètres; idem Station 166, nº 484, profondeur 11 à 15 mètres.

Les échantillons recueillis ont une couleur rose-pâle, avec un contour arrondi dans l'ensemble; les thalles sont lobés aux bords, et ils s'amincissent vers leur marge de sorte qu'ils paraissent se fondre avec le substratum, tandis que dans la plupart des espèces, les bords sont déchiquetés et saillants; l'épaisseur des croûtes est très faible, et elles sont très unies.

Au point de vue de la structure, la plupart des échantillons de Tenedos ne sont pas très caractéristiques; l'hypothalle n'y montre pas ses cellules obliques et contournées si curieuses; j'ai déjà montré qu'il en était quelquefois ainsi pour une espèce voisine *L. pustulatum*, en particulier lorsqu'on examine les cellules des bords du thalle. Dans les échantillons en question il est formé de cellules soit carrées, soit rectangulaires, sans forme spéciale, de 17 à 22 μ × 7 à 20 μ. Dans d'autres échantillons l'hypothalle montre, dans une même coupe, en certains points des cellules obliques, en d'autres des cellules verticales; c'est ce qui m'a permis de ranger tous ces échantillons dans la même espèce *L. hapalidioides*.

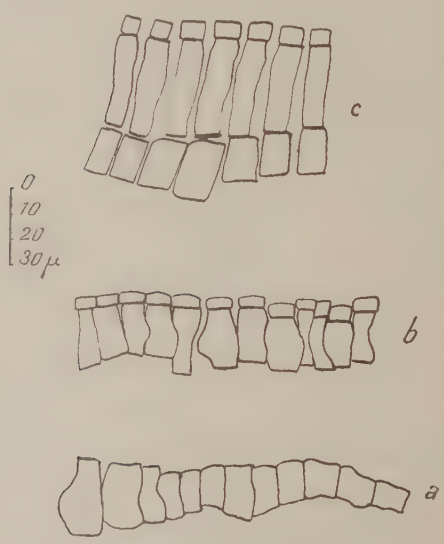


Fig. 5. Variation de l'aspect des coupes de *Lithophyllum (Derm.) hapalidioides* dans des échantillons très minces de l'Ile Tenedos (Station 165, nº 481).

Certains thalles ne sont constitués que par l'unique rangée de cellules de l'hypothalle (*a*, fig. 5); dans d'autres il existe au-dessus de l'hypothalle soit simplement une écorce (*b*, fig. 5), soit une rangée périthallienne surmontée d'une rangée corticale (*c*, fig. 5), soit enfin six ou sept rangées périthalliennes; les cellules des rangées périthalliennes mesurent 30 à 39 μ × 7 à 10 μ; celles de l'écorce ont 5 μ × 10 μ.

En résumé le tissu est constitué par une à trois rangées de cellules dans les échantillons minces; son épaisseur n'est alors que de 60 à 70 μ. Mais dans d'autres échantillons de la même localité, on peut observer jusqu'à neuf rangées (hypothalle, 7 rangées périthalliennes, écorce).

Répartition géographique.

En Méditerranée *L. hapalidioides* était inconnu jusqu'ici; on n'y connaissait que la variété *confinis* signalée à Marseille et à Oran. Il est très intéressant de la signaler dans la Mer Egée et au voisinage de l'Ile de Malte.

La profondeur à laquelle elle vit à l'Ile Tenedos (11 à 35 mètres) et dans la Méditerranée (Station 142, 98 mètres) est la même que celle où on la récolte sur les côtes de France et de Grande-Bretagne; au contraire la variété *confinis* est une variété littorale.

LITHOPHYLLUM (DERMATOLITHON) PAPILLOSUM (Zan.) Fosl.

1843 *Lithothamnium papillosum* Zanardi, Saggio, p. 43.
1883 *Lith. papillosum* Zan.; Hauck, Meeresalg., p. 272, Pl. II, fig. 4.
1905 *Lithophyllum papillosum* Zan.; Foslie, Lith. Adr. Meere, p. 27.
1905 *Lithoph. papillosum* Zan; de Toni, Sylloge, p. 1794.

Sardaigne: S. E., Piras sinus, Station 201, nº 559, 26 Août 1910.

L'unique échantillon recueilli par le "Thor", figuré ici Pl. I, fig. 13, est composé d'un grand nombre de petites croûtes minces ayant poussé sur d'autres croûtes de la même espèce: ces croûtes ont un contour souvent arrondi et sont épaissies aux bords; elles sont fréquemment mamelonnées ou pourvues de sortes d'épines.

Répartition géographique.

Dans la Méditerranée, cette espèce a été signalée en France: à Banyuls et à Antibes, en Algérie: à Tipaza et en huit localités de l'Adriatique. C'est la première fois que l'espèce est signalée en Sardaigne et elle est encore inconnue en Italie.

MELOBESIA LEJOLISII Rosan.

1866 *Melob. Lejolisii* Rosanoff, Mélob., p. 62, Pl. I, fig. 1—13, pl. VII, fig. 9 à 11.
1905 *M. Lejolisii* Ros.; de Toni, Sylloge, p. 1766.
1911 *M Lejolisii* Ros.; Lemoine, Mélob., p. 180, fig. 103.

Sicile: Isola Bella, près Taormine, Station 191, nº 500, 20 Août 1910, littoral.

Description: Cette espèce formait des croûtes de couleur rouge, extrêmement minces, d'environ 15 μ d'épaisseur seulement. En coupe (fig. 6), ces croûtes sont constitués par deux rangées de cellules, une rangée inférieure dont les cellules mesurent 13 à 15 μ de hauteur et 5 à 7 μ de largeur et une rangée supérieure dont les cellules mesurent 3 μ de hauteur et 7 μ de largeur. Lorsqu'on observe le thalle de dessus, les cellules mesurent 8 à 13 μ × 7 à 9 μ.

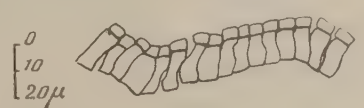


Fig. 6. Coupe d'un thalle de *Melobesia Lejolisii* de Taormine, Sicile.

Les dimensions des cellules et la disposition du tissu permettent de ranger ces échantillons dans le *Melobesia Lejolisii* dont ils se distinguent cependant par l'absence d'une rangée basilaire de petites cellules, qui existe généralement dans cette espèce, en plus des deux autres rangées.

Les conceptacles mesurent 150 à 200 μ et renferment des bispores de 43 et 52 μ. Après décalcification les conceptacles ont une bordure très large.

On avait signalé dans cette espèce la présence de bispores mélangées aux tétraspores; dans les échantillons de Taormine je n'ai observé que des bispores; de plus leur taille est plutôt faible par rapport à celle indiquée par Foslie pour les bispores et les tétraspores: 50 à 80 μ.

Répartition géographique.

M. Lejolisii a déjà été signalée en Sicile, sous le nom de *M. membranacea*, mais sans indication de localité précise.

En dehors de la Sicile elle est connue à Monaco, à Gênes, Naples, Alger et dans la Mer Adriatique.

MELOBESIA FARINOSA Lmx.

1816 *Melobesia farinosa* Lamouroux, Polypiers flex., p. 315, Pl. XII, fig. 3.
1849 *Melob. farinosa* Kutzing, Sp. alg., p. 696.
1858 *Melob. granulata*, Men.; Kutzing, Tab. Phyc., XIX, pl. 95, fig. c, e.
1866 *Melob. farinosa* Lmx.; Rosanoff, p. 69, pl. II, fig. 3 à 5, 10 à 12, pl. III, fig. 2 à 13, pl. IV, fig. 1, 10, pl. VII, fig. 12.
1905 *Melob. farinosa* Lmx.; Foslie, Rem. on north. Lith., p. 96.
1905 *M. farinosa* Lmx.; de Toni, Sylloge, p. 1764.
Synonymes: *Melobesia granulata*, *Melobesia verrucata* auct.

Espagne: Cap de Gata, Station 105, 24 Juin 1910, profondeur 15 à 20 mètres.

Les échantillons fixés sur Zostère montrent au microscope les cellules hétérocystes caractéristiques de l'espèce; lorsqu'on observe le thalle à plat on remarque que les cellules du tissu sont dans l'ensemble disposées en rangées sinueuses, ces rangées sont séparées par des cloisons qui se colorent fortement. Ces cellules mesurent 12 à 20 μ de longueur et 7 à 8 μ de largeur, et en particulier 10 à 15 μ au voisinage des hétérocystes. Les conceptacles mesurent 130 à 150 μ de diamètre avec un pore unique.

Répartition géographique.

M. farinosa a déjà été signalée en de nombreux points de la Méditerranée; cependant elle n'avait pas encore été signalée en Espagne où le "Thor" l'a recueillie.

En Méditerranée voici la liste des localités où cette espèce est connue: Baléares; France: Collioure, Marseille (B. du R.), Toulon, Giens (Var), Antibes (Alpes Mar.); Monaco; Italie: plusieurs localités de Ligurie; Sardaigne; Naples; Ile Lampedusa; Ile de Malte; Sicile; Mer Adriatique: Venise; Algérie: Ile Galite, Alger; Syrie; Tripolitaine; Ile de Rhodes.

MELOBESIA (PLIOSTROMA) ZONALIS (Crouan) Fosl.

Bibliographie: voir Lemoine, Mélob. Ouest Irlande, 1913, p. 140, fig. 7.

Espagne: Cap de Gata, Station 105, nº 379, 24 Juin 1910, profondeur 15 à 20 mètres, sur coquille *d'Anomia* (avec *Lithophyllum expansum*).
Tripolitaine: Grande Syrte, Station 150, nº 417, 26 Juillet 1910, profondeur 35 mètres (sur *Halimeda*) (?).
Sicile: Taormine, 14 Décembre 1908, profondeur 3 à 16 mètres (thalles visibles seulement à la loupe, sur l'extrémité des filaments de *Posidonia*) avec *L. pustulatum*.
Mer Egée: Ile Tenedos, Station 165, nº 481, 482, profondeur 35 mètres, 5 Août 1910 (sur *Halimeda*) (?) — idem, Station 167, nº 486, profondeur 11 à 15 mètres sur caillou (avec *Lithothamnium Lenormandi*).

Cette très petite espèce est souvent difficile à distinguer de plusieurs autres petites espèces: *Epilithon membranaceum*, *Melobesia Lejolisii* et *M. farinosa*; la coupe verticale des thalles qui permettrait aisément la distinction est souvent difficile à réussir à cause de la ténuité des thalles. L'observation des thalles à plat permet la détermination très facile du *M. farinosa* par la présence des cellules hétérocystes; les autres espèces montrent des différences notables dans la dimension de leurs cellules. Les cellules de *M. zonalis* sont plus grandes que celles de *M. Lejolisii* et de *E. membranaceum*. Dans les échantillons recueillis par le "Thor" les cellules mesurent 10 à 20 μ de longueur et 8 à 12 μ de largeur; ces cellules sont rectangulaires et relativement larges par rapport à leur hauteur.

Les conceptacles de l'échantillon du Cap de Gata sont arrondis et mesurent 125 à 150 μ de diamètre.

Répartition géographique.

Cette espèce, connue jusqu'ici seulement en un petit nombre de localités, n'avait été signalée dans la Méditerranée qu'à Banyuls (Pyr. Orient.) et à Marseille (Joleaud in Lemoine 1914).

CORALLINA MEDITERRANEA Aresch.

Bibliographie: voir de Toni, Sylloge, 1905, p. 1841.

Sicile: Isola Bella près Taormine, St. 191, n. 499—500, 20 Août 1910.
Petit échantillon non fructifié.

AMPHIROA RIGIDA Lmx.

Bibliographie: voir de Toni, 1905, p, 1807.

Sicile: Isola Bella, près Taormine, St. 191, 20 Août 1910 (fructifié).

PEYSSONNELIA POLYMORPHA (Zan.) Schmitz.

Bibliographie: voir Lemoine et Mouret 1912.

Mer Egée: Ile Tenedos, Station 165, nº 481 à 483, 5 Août 1910, profondeur 35 mètres.

Peyssonelia polymorpha doit être mise tout à fait à part dans cette liste des espèces recueillies par le "Thor"; seule en effet elle appartient à la famille des Squamariacées. Mais cette espèce rappelle par son aspect certaines espèces de Mélobésiées, en particulier *Lithophyllum expansum* et surtout *Lithothamnium Philippii*, et on la récolte très fréquemment associée aux Mélobésiées avec lesquelles on la confond souvent. Cette espèce dont il a été question plus longuement ailleurs (Lemoine et Mouret 1912) se présente sous l'aspect de croûtes irrégulières, fortement incrustées de calcaire et cassantes, de couleur brique foncé, quelquefois rose; ce sont surtout les échantillons de couleur rose qui sont difficile à distinguer de certaines Mélobésiées. Un échantillon recueilli par le "Thor" a été figuré Pl. I, fig. 8.

Répartition géographique.

Il a été donné (Lemoine et Mouret 1912) un certain nombre de localités nouvelles pour cette espèce qui paraissait à tort être très rare dans la Méditerranée.

Actuellement elle est connue en France: Banyuls, Marseille, Toulon, Nice, Villefranche; aux Baléares; en Italie: Porto Maurizio, Gênes, Naples; en Sicile; en Adriatique; en Tripolitaine: Tripoli; en Algérie; Alger, St Eugène, Tipasa; elle n'était pas encore connue au-delà de la Mer Adriatique avant les recherches du "Thor". Son extension paraît à présent considérable, puisqu'elle vit en Méditerranée, depuis les Baléares, jusqu'aux Dardanelles.

B. Conclusions.

Les algues calcaires recueillies par les deux Expéditions du "Thor" sont au nombre de 22 espèces, récoltées dans de nombreuses localités, la plupart nouvelles. Voici la liste des localités nouvelles:

Espagne: trois espèces recueillies au Cap de Gate sont nouvelles pour l'Espagne: ce sont:

Lithophyllum expansum
Melobesia farinosa
M. zonalis.

Baléares: une espèce est nouvelle:

Lithothamnium calcareum.

Sicile: sur neuf espèces recueillies à Taormine (côte Est de Sicile), trois espèces sont nouvelles pour la Sicile:

Lithothamnium Haucki
L. subtenellum
Melobesia zonalis.

et d'autre part six espèces déjà connues en Sicile sont nouvelles pour la localité de Taormine.

Sardaigne: une espèce est nouvelle:

Lithophyllum papillosum.

Algérie: quatre espèces déjà connues en Algérie sont nouvelles pour la localité d'Oran:

Lithothamnium calcareum
L. Haucki
Lithophyllum expansum
L. lichenoides.

Tripolitaine: quatre espèces sont nouvelles pour la Tripolitaine: les deux premières ont été recueillies à Derna et dans la Grande Syrte et les deux dernières seulement dans la Grande Syrte

Lithothamnium Haucki
Lithophyllum expansum
Lithophyllum solutum
Melobesia zonalis

une espèce déjà connue à Tripoli est nouvelle pour la Grande Syrte: *L. pustulatum.*

Parages de l'Ile de Malte: trois espèces seulement étaient connues à l'Ile de Malte. Le "Thor" a recueilli deux espèces à la Station 142:

Lithothamnium Lenormandi
Lithophyllum (Dermatolithon) hapalidioides.

Grèce: sept espèces recueillies à Ægina et à Salamis sont nouvelles pour la Grèce:

Lithothamnium Philippii
Lithothamnium crispatum
Litholh. fruticulosum
L. calcareum
L. Lenormandi
Lithophyllum racemus
L. solutum.

Mer Egée: neuf espèces recueillies à l'Ile Tenedos sont nouvelles pour la Mer Egée et de plus *L. solutum* n'y était connue qu'en une localité très éloignée de Tenedos, à l'île Nisyros.

Lithothamnium Lenormandi
L. crispatum
L. Philippii
L. Haucki
Lithophyllum racemus
L. lichenoides
L. expansum
L. (Derm.) hapalidioides
Melobesia zonalis.

Cette liste de localités nouvelles montre tout l'intérêt qu'ont les récoltes du "Thor". Elles ont permis de préciser et d'étendre nos connaissances sur la répartition des Corallinacées et en particulier des Mélobésiées méditerranéennes; en effet la flore de Mélobésiées de la Méditerranée orientale était très incomplètement connue et l'absence, dans les herbiers, d'échantillons de cette région, pouvait faire supposer qu'elles n'y vivaient pas.

Nous savons à présent qu'il n'en est rien et que la plupart des espèces se retrouvent dans toutes les parties de la Méditerranée.

III. Répartition géographique des Corallinacées méditerranéennes.

Les relations des flores et des faunes atlantiques et méditerranéennes sont intéressantes à considérer et méritent d'être traitées. Pour mettre en évidence les migrations des espèces originaires de l'une ou de l'autre de ces mers il faut répartir la flore de Corallinacées de la Méditerranée en quatre groupes:

I. Espèces méditerranéennes inconnues dans l'Atlantique. Dans ce groupe je distinguerai:
   A. les espèces localisées à la Méditerranée.
   B. les espèces ayant une répartition plus étendue et qu'on trouve dans la Mer Rouge, l'Océan Indien, le Pacifique.

II. Espèces vivant dans la Méditerranée et dans les régions de l'Atlantique avoisinant la Méditerranée. Certaines de ces espèces se retrouvent de plus dans l'Océan Indien, l'Océan Pacifique.

III. IV. Espèces réparties à la fois dans la Méditerranée et dans l'Atlantique. Je distinguerai les espèces qui ne vivent qu'en Europe (groupe III) et celles qui vivent à la fois en Europe et en Amérique (groupe IV).

I. Espèces méditerranéennes inconnues dans l'Atlantique.

A. Espèces localisées à la Méditerranée.

Archæolithothamnium mediterraneum Heyd.[1].
Lithothamnium macroblastum Fosl. — Golfe de Naples.
Lithothamnium valens Fosl. — Mer Adriatique, Ile de Rhodes.
Lithophyllum affine Fosl. et Howe — Grèce.
Litholepis mediterranea Fosl. — Banyuls (Pyrénées-Orientales).
Corallina nana Zan. — France (Bouches-du-Rhône), Italie, Egypte, Algérie.
Amphiroa cryptarthrodia Zan.

B. Espèces ayant une répartition plus étendue.

Lithophyllum racemus (Lmk.). Fosl. — Golfe de Siam.

Cette espèce a été signalée pas erreur dans l'Ouest de l'Irlande (voir à ce sujet Cotton 1912) et à Brest. Les échantillons de Floride, des Bahamas, de Mauritanie qui font partie de la collection Thuret-Bornet paraissent appartenir à d'autres espèces. D'autre part l'espèce signalée sous le nom de *L. racemus* dans l'Océan Indien (Maurice et Rodriguez) et dans la Mer Ronge (Ile Kamarane) est le *L. Kaiserii* et celle signalée en Californie est le *L. pallescens*.

Lithophyllum (Dermatolithon) papillosum (Zan.) Fosl. — Mer Noire; Pacifique: Timor.

Cette espèce avait été signalée sans doute par erreur au Croisic (Loire Inf.) à Roscoff (Finistère) et à Cherbourg (Manche) où pousse le *L. hapalidioides var. confinis* avec lequel il a pu être confondu.

Corallina adherens (Lmx.) Kütz. — Mer Rouge; côte est de l'Afrique; Pacifique: Japon, Java, Archipel Malais.
Corallina virgata Zan. — Adriatique, Ile de Rhodes, Egypte, Italie; Australie: Sydney.

II. Espèces méditerranéennes vivant dans les parties avoisinantes de l'Atlantique.

Lithothamnium Philippii Fosl. — Tanger, Canaries, Funafuti (Ellice Island)?
Lithothamnium crispatum Hauck — Mauritanie, (sans localité).
Lithothamnium fruticulosum (Kütz.) Fosl. — Tanger, Mauritanie (sans localité); Mer Rouge: Anfila, Djibouti; Iles Maldives; Golfe de Siam; Archipel Malais: Java, Bornéo; Sud de l'Australie.

Cette espèce a été signalée par erreur dans l'Ouest de l'Irlande et en Norvège.

Lithothamnium Haucki Rothpl. — Tanger. C'est probablement par erreur que l'espèce a été signalée dans l'Ouest de l'Irlande.
Lithophyllum byssoides (Lmx.) Heyd. — Maroc (sans localité); Mauritanie (sans localité); Mer Rouge; Philippines; Pacifique: Galapagos, Honolulu, Samoa.
Lithophyllum dentatum (Kütz.) Fosl. — Tanger.
Lithophyllum expansum Phil. — S. de l'Espagne: Cadix; Tanger; Canaries; Cap Blanc; Golfe d'Aden.

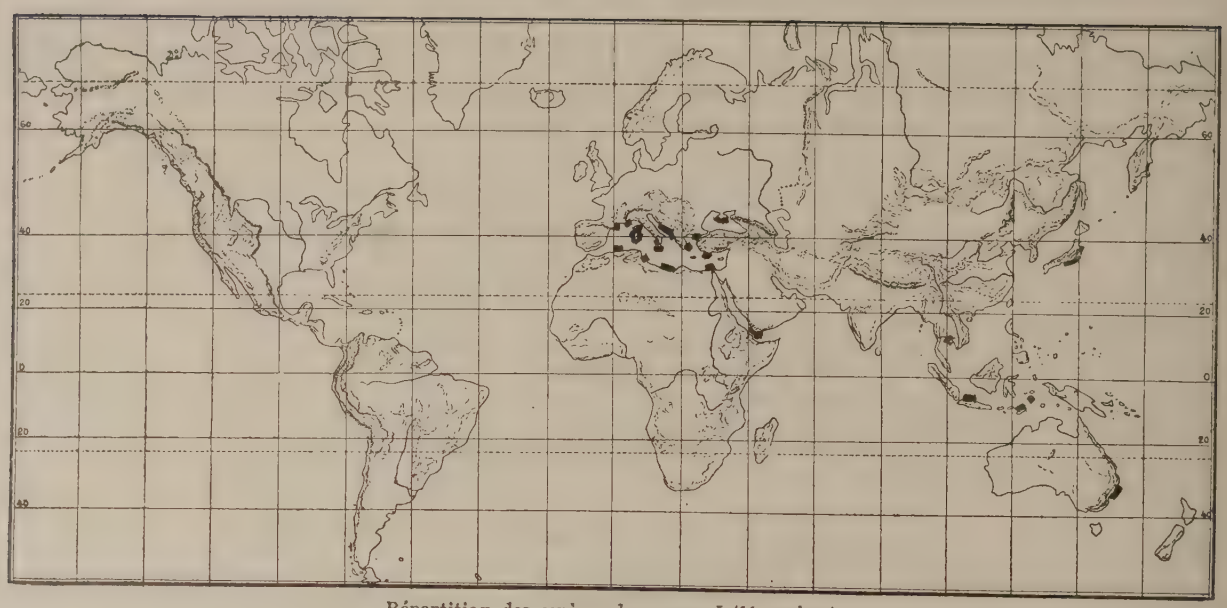
C'est probablement à tort que cette espèce a été signalée à Jersey.

Lithophyllum decussatum (Ell. et Sol.) Phil. — Portugal; Pacifique: Galapagos.
Lithophyllum solutum Fosl. — Mauritanie: Cap Blanc.

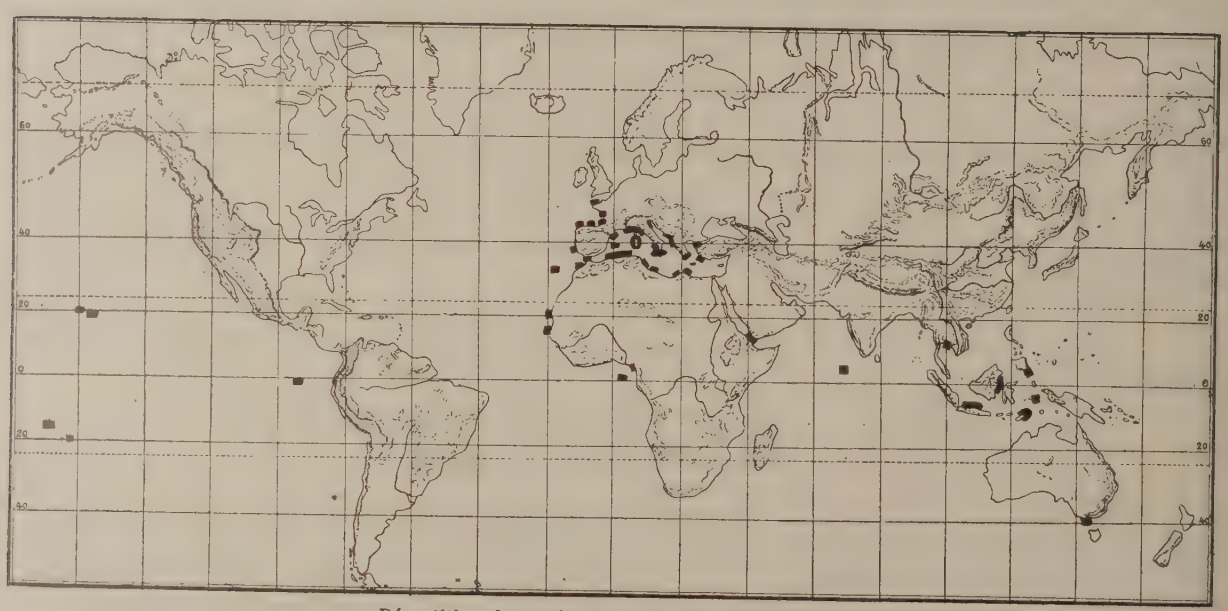
Il n'est pas probable que la détermination du *L. solutum* à Roscoff (Finistère) (Heydrich 1908) et dans le Golfe du Morbihan (Foslie 1898) soient exactes. Il s'agit sans doute de formes du *Lithothamnium calcareum*.

Lithothamnium subtenellum Fosl. — Roscoff (Finistère) (?) Heydrich 1911), Sables d'Olonne (Vendée), Basses-Pyrénées, Nord de l'Espagne, Ile San Thomé.
Tenarea tortuosa (Esp.) Lem. — Ile d'Yeu (Vendée), Basses-Pyrénées, Nord de l'Espagne; Maroc: Tanger, El Arisch; Canaries.
Jania longifurca Zan. — Basses-Pyrénées au Maroc.
Amphiroa Beauvoisi Lmx. — Lisbonne; Maroc: Tanger.
Amphiroa verruculosa Kütz. — Basses-Pyrénées, Nord de l'Espagne, Ile Hawaï.

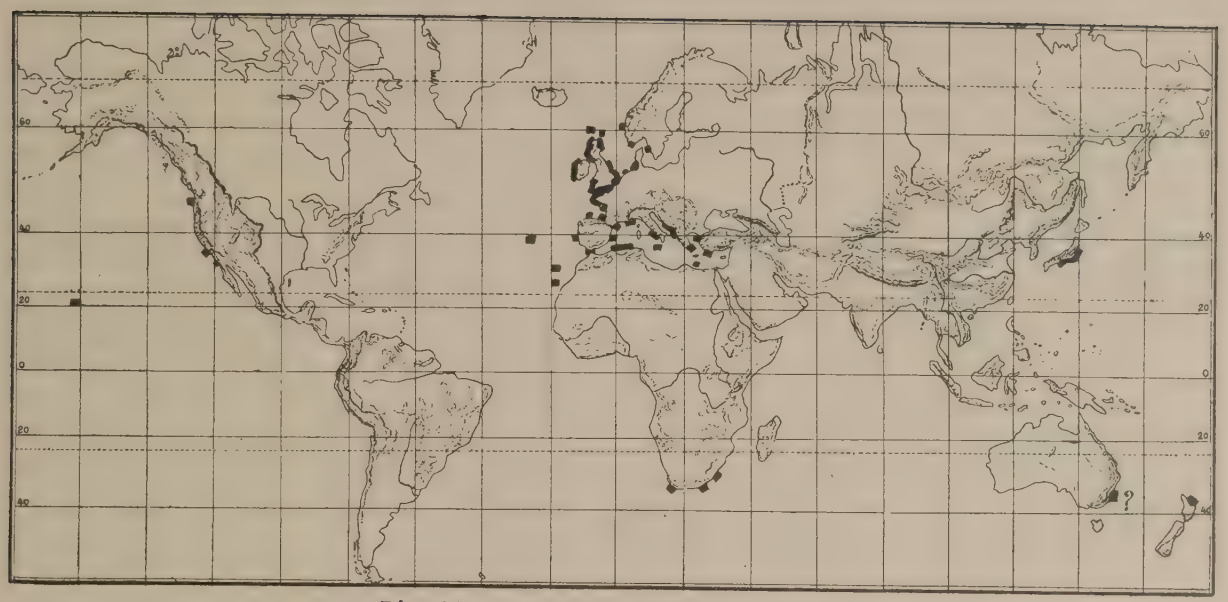
[1] Voir la note 1 de la page 5.



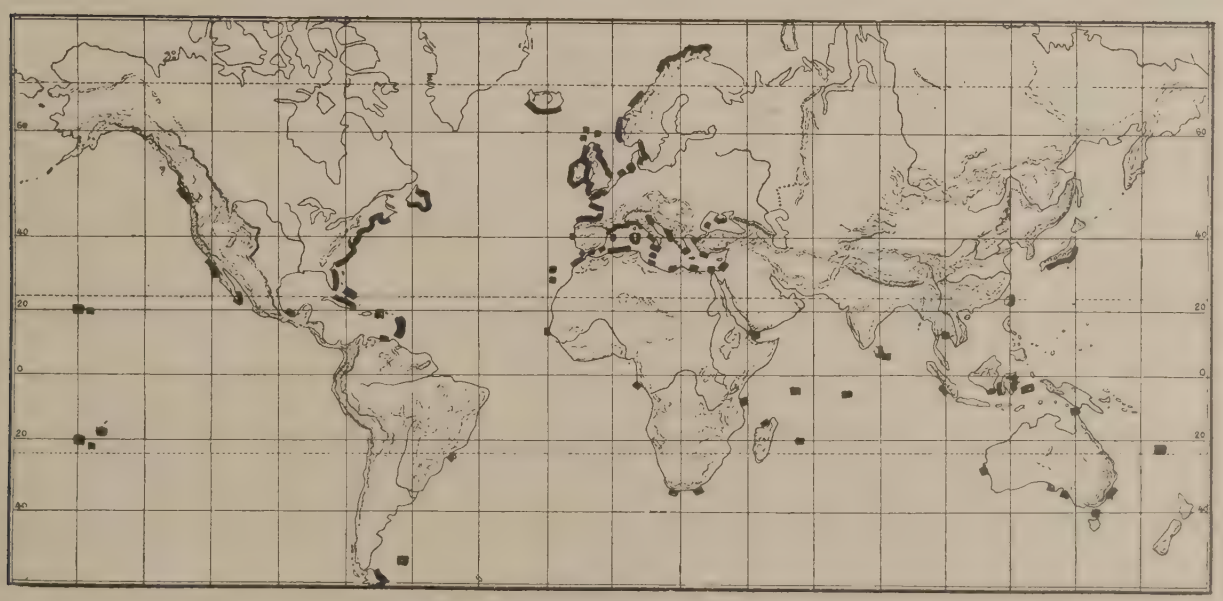
Répartition des espèces du groupe I (11 espèces).



Répartition des espèces du groupe II (14 espèces).



Répartition des espèces du groupe III (9 espèces).



Répartition des espèces du groupe IV (13 espèces).

III et IV. Espèces atlantiques et méditerranéennes.

III. Espèces vivant seulement sur la côte européenne de l'Atlantique et non sur la côte américaine.

Lithothamnium calcareum (Pall.) Aresch. — Vit en Europe depuis les Orcades et le Sud de la Norvège, en Grande-Bretagne, en France sur les côtes de la Manche et de l'Atlantique jusqu'en Loire-Inférieure; signalée de plus au Portugal, à Tanger, en Mauritanie (échantillons morts) et à Honolulu (?)

Lithothamnium Sonderi Hauck — Vit en Grande-Bretagne (Ecosse et Irlande), en Norvège, en France: Manche, Bretagne et Basses-Pyrénées.

Lithophyllum lichenoides (Ell.) Phil. — Grande-Bretagne: Ouest de l'Irlande, Sud-Ouest de l'Ecosse, côtes de la Manche; Helgoland; Iles Anglo-Normandes; France depuis le Pas-de-Calais jusqu'au Finistère, Basses-Pyrénées; Nord de l'Espagne; Tanger; Sud de l'Afrique (Algoa). Cette espèce a été signalée à l'Ile Kerguelen, mais en général l'espèce signalée dans les régions subantarctiques est le *L. antarcticum*.

Lithophyllum (Dermatolithon) hapalidioides (Cr.) Fosl. — Vit en Grande-Bretagne aux Faeroes, sur les côtes de l'Angleterre, l'Ouest de l'Irlande; en France: dép. de la Manche, du Finistère, de la Loire-Inférieure; Nord de l'Espagne; Iles Açores, Iles Canaries.

Melobesia (Pliostroma) zonalis (Cr.) Fosl. — Europe: sur toutes les côtes de Grande-Bretagne à partir des Orcades; France: Finistère.

Choreonema Thureti (Born.) Schm. — Ouest de l'Irlande; Manche; Océan Atlantique: de la Loire Inférieure au Nord de l'Espagne; Maroc; Japon (Misaki); Australie; Nouvelle-Zélande.

Corallina granifera Kütz. — Atlantique: Ile Madère, Iles Canaries, Maroc; Californie: Ile Guadeloupe; Australie (?)

Jania rubens (L.) Lmx. — Atlantique depuis la Norvège jusqu'au littoral de l'Afrique du Nord et les Canaries; Sud de l'Afrique: Natal; Brésil (Mobius).

Jania corniculata (L.) Lmx. — Atlantique depuis l'Angleterre jusqu'à Gades et au Maroc (d'après Bornet).

IV. Espèces vivant à la fois sur les côtes européennes et américaines de l'Atlantique.

Lithothamnium Lenormandi (Aresch.) Fosl. — Etats-Unis: Nouvelle-Ecosse, New-Hampshire, Connecticut; Jamaïque. — Europe, depuis les Orcades et la Norvège, la Mer du Nord et la Baltique jusqu'au Golfe de Gascogne; Canaries, Tanger; Méditerranée, Crimée — Amérique du Sud: Brésil, Terre de Feu; Antarctique: Terre de Graham; Pacifique: Golfe de Californie (?)

Lithothamnium polymorphum (L.) — Etats-Unis: Rhode Island; Antilles; Europe: depuis l'Islande, la Norvège et les Faeroës jusqu'à la Loire-Inférieure; Tanger.

Lithothamnium Notarisii Duf. — Tanger, Japon, Floride.

Lithophyllum incrustans Phil. — Jamaïque. Europe: depuis l'Irlande jusqu'à la côte nord de l'Espagne; Maroc: Tanger, Mazagan; Canaries; Mauritanie: Cap Blanc; Cap de Bonne Espérance?; Océan Indien: Golfe d'Aden, Ile Maurice (?); Pacifique: Iles Hawaï, Vancouver.

Lithophyllum (Dermatolithon) pustulatum (Lmx.) Fosl. — Etats-Unis: depuis la Nouvelle-Ecosse jusqu'en Floride; Antilles; Europe: depuis les Faeroës jusqu'au Nord de l'Espagne; Maroc: Tanger, Rabat; Madère; Canaries; Cap Blanc, Sénégal; Mer Noire: Crimée; Océan Indien: Golfe d'Aden, Ile Maurice; Natal; Pacifique: Ile Formose, Golfe de Siam, Philippines, Australie côte Est et Sud, Nelle Calédonie, Ile de Cook, Golfe de Californie, Californie.

Epilithon membranaceum (Esp.) Heyd. — Etats-Unis: Massachusetts, Rhode Island; Antilles; Amérique du Sud: Brésil (?); Europe: depuis l'Ecosse et l'Irlande jusqu'au Nord de l'Espagne; Cadix; Tanger; Maroc: Rabat; Canaries; Afrique: Cap Blanc, Cap Vert, Congo; Cap de Bonne Espérance; Océan Indien: Golfe d'Aden, Ceylan; Mer Noire: Crimée; Pacifique: Australie côte Nord et Ouest, Californie.

Melobesia Lejolisii Rosan. — Etats-Unis: depuis le New-Hampshire jusqu'en Floride; Antilles; Europe depuis l'Est de l'Angleterre et l'Irlande jusqu'en Bretagne (Finistère).

Melobesia farinosa Lmx. — Etats-Unis: depuis le Massachusetts jusqu'en Floride; Bahamas; Antilles; Europe depuis l'Irlande, l'Ecosse et la Hollande jusqu'au Nord de l'Espagne; Canaries; Afrique: W. Cap Blanc et Cap Vert; E. Golfe d'Aden, Dar ès Salam; Madagascar, Seychelles, Ile Maurice; Golfe de Siam; Pacifique: Ile Formose, Philippines, N. et S. de l'Australie, Nelle Calédonie, Honolulu.

Melobesia Solmsii Born. in herb. (= *callithamnioides* Flkg., Solms) — Manche, côte anglaise; Canaries; Bahamas; Antilles; Océan Indien: Chagos.

Corallina officinalis L. — Islande et Norvège jusqu'en Portugal; Etats-Unis: de Terre-Neuve jusqu'au Maryland; Crimée; Golfe de Californie.

Corallina mediterranea Aresch. — Etats-Unis: Massachusetts; Falkland; Europe depuis le sud de l'Angleterre jusqu'à l'île Madère et les Canaries; Maroc: Tanger (?), Rabat; Japon.

Amphiroa fragilissima (L.) Lmx. — Bermudes: Antilles; Floride, Mexique, Venezuela; Pacifique: Philippines; Tahiti; Océan Indien: Madagascar.

Amphiroa rigida Lmx. — Antilles; Japon.

En résumé, la flore de Corallinacées de la Méditerranée se compose de 47 espèces. Sur ces 47 espèces de la Méditerranée, 11 espèces sont inconnues dans l'Atlantique (groupe I), 14 ne se retrouvent dans l'Atlantique que dans les parties avoisinantes (groupe II), 9 espèces ont, sur les rivages européens de l'Atlantique, une répartition plus étendue (groupe III), 13 espèces vivent à la fois sur les rives américaines et européennes de l'Atlantique (groupe IV).

Il en résulte que 25 espèces (groupes I et II) seraient probablement d'origine méditerranéenne, et 22 espèces (groupe III et IV) seraient d'origine incertaine.

Les espèces ubiquistes font partie du dernier groupe (IV) des espèces méditerranéennes réparties à la fois dans tout l'Atlantique; mais parmi ces 13 espèces il me semble que dans l'état actuel de nos connaissances, on ne peut guère considérer comme véritablement ubiquistes que cinq ou six d'entre elles.

Il faut remarquer le très petit nombre d'espèces localisées à la Méditerranée et inconnues dans les autres mers: 7 espèces, soit $^1/_7$ seulement de l'ensemble de la flore, ne dépassent pas les limites de la Méditerranée et encore sont-ce, pour la plupart, des espèces peu connues.

Au point de vue spécial de l'étude du passage des flores à travers le Détroit de Gibraltar, il semble que, pour les Corallinacées, ce passage n'ait eu lieu que dans un seul sens: en effet il existe un certain nombre de Corallinacées (14 espèces, groupe II) de la Méditerranée qui se retrouvent dans les parties de l'Atlantique voisines du Détroit de Gibraltar: de la Mauritanie au Golfe de Gascogne en comprenant les Canaries. Deux espèces seulement dépassent ces limites: le *Tenarea tortuosa*, abondant dans le Golfe de Gascogne, se retrouve plus au Nord dans la seule localité de l'île d'Yeu et le *Lithothamnium subtenellum* vit en Vendée et peut-être aussi dans la localité privilégiée de Roscoff (Finistère).

Pour toutes ces espèces la migration de la Méditerranée dans l'Atlantique à travers le Détroit de Gibraltar ne paraît pas faire de doute.

Mais, inversement, il n'existe aucune espèce atlantique qui soit localisée dans la partie occidentale de la Méditerranée, et pour laquelle la migration d'Atlantique en Méditerranée à travers le Détroit de Gibraltar, soit évidente. Toutes les espèces paraissent réparties à peu près uniformément dans toute la Méditerranée (en y comprenant l'Adriatique) et les recherches du "Thor" en Grèce et dans la Mer Egée ont justement fait connaître, dans la partie orientale de la Méditerranée un certain nombre de localités nouvelles pour des espèces qui y étaient encore inconnues, étendant par suite leur extension dans tout le bassin méditerranéen.

10. IV. 1915.

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Explication de la Planche.

Fig. 1 à 7. Divers thalles de *Lithophyllum expansum* provenant de plusieurs localités de la Méditerranée.

1. Echantillon composé de lamelles minces poussant les unes au-dessus des autres. (Taormine, Sicile, profondeur 3 à 16 mètres, Décembre 1908).

2, 3, 4. Croûtes planes, très cassantes, recueillies sans support. **2**. (Isola Bella, près Taormine, Station 191 — **3**, **4**. Andalusia sinus près Oran, Station 221, profondeur 35 mètres.

5, 6, var. *tenuis*. Croûtes de petite taille, orbiculaires ou en forme de chapeau. La figure 5 montre la transition avec les autres échantillons de la même espèce. (Andalusia près Oran, Algérie, Station 221; fig. 5, profondeur 35 mètres; fig. 6, profondeur 15 mètres).

7. var. *tenuis*. Croûtes encore plus petites, orbiculaires, fixées à l'extrémité des fibres de Posidonia. (Grande Syrte, Tripolitaine, Station 149, profondeur 74 à 80 mètres).

8. *Peyssonnelia polymorpha*. (Ile Tenedos, Station 165).

9. Divers thalles de *Lithophyllum solutum*, (Grande Syrte, Tripolitaine, Station 150).

10. Echantillons de *Lithophyllum Racemus*. (Ægina, Grèce, Station 17, profondeur 55 mètres).

11. *Lithophyllum lichenoides*. (Isola Bella près Taormine, Station 191). La croûte s'est étalée sur un caillou et diffère ainsi des échantillons normaux de cette espèce; elle montre cependant les stries concentriques qui sont très caractéristiques du *L. lichenoides*.

12. Croûtes de *Lithothamnium subtenellum* sur une pierre. (Isola Bella près Taormine, Sicile, Station 191).

13. *Lithophyllum (Dermatolithon) papillosum*. Croûtes petites et très minces poussant les unes sur les autres. (Sardaigne: Pira sinus, Station 201).

14. Thalles de *Lithothamnium Philippii* entourant un support. (Ægina, Grèce, Station 17).

15. Croûtes de *Lithothamnium Haucki* et thalles de *Corallina mediterranea*. (Isola Bella, près Taormine, Sicile, Station 191).

Explication de la Planche.

Fig. 1. Spécimens de plusieurs localités de la Méditerranée, vus au-dessus des autres. (Taormine, Sicile, Station 17, profondeur 55 mètres).

Fig. 2. Isola Bella, près Taormine, Sicile, Station 17, profondeur 55 mètres.

Fig. 3. Spécimen en forme de chapeau. La figure 5 montre la face inférieure de ce spécimen. Mers près Oran, Algérie, Station 221; fig. 5, profondeur 55 mètres.

Fig. 4. Spécimen montrant des fibres à l'extrémité des fibres de Posidonies. Profondeur 55 mètres.

Fig. 5. Face inférieure du spécimen fig. 3. (Mers près Oran, Algérie, Station 221, profondeur 55 mètres).

Fig. 6. Spécimen (Tripolitaine, Station 150).

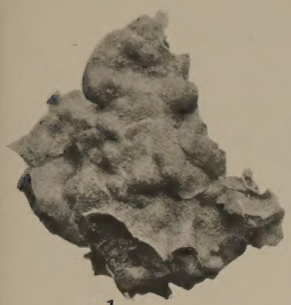
Fig. 7. Spécimen (Sicile, Station 17, profondeur 55 mètres).

Fig. 8. Spécimen (Sicile, Station 191). La croûte s'est étalée sur un support de Posidonies. Elle montre cependant les stries concentriques de croissance.

Fig. 9. Spécimen (Isola Bella près Taormine, Sicile, Station 17, profondeur 55 mètres) montrant des lames très minces et très minces poussant les unes sur les autres.

Fig. 10. Spécimen (Ægina, Grèce, Station 17).

Fig. 11. *Lithothamnion mediterranea*. (Isola Bella, près Taormine, Sicile, Station 17, profondeur 55 mètres).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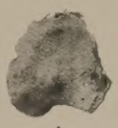
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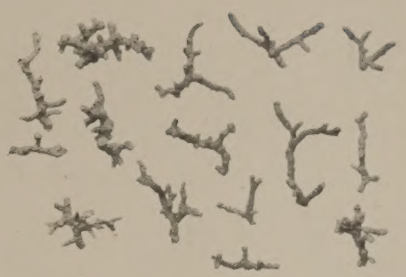
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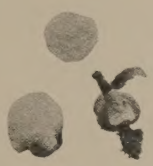
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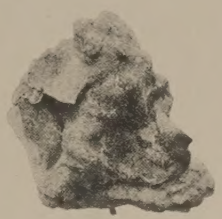
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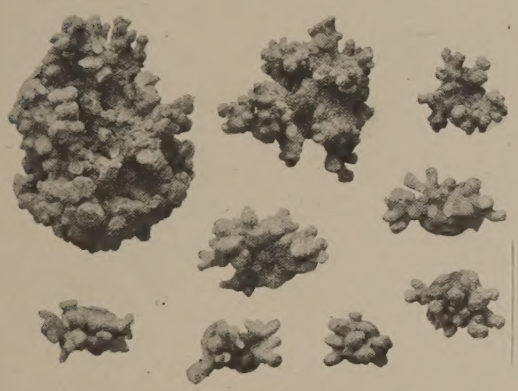
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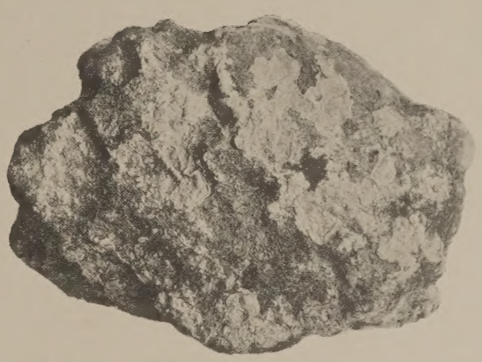
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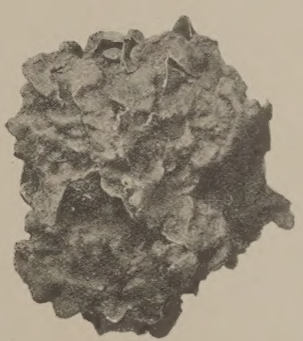
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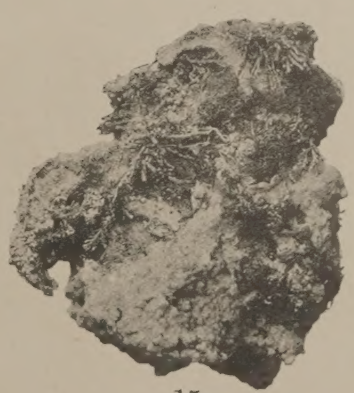
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Typ. Bianco Luno.

List of Papers resulting in whole or in part from the Cruises of the Danish Research-Steamer "Thor" in the Atlantic and Mediterranean.

1. Hydrography.

J. P. JACOBSEN, in Schmidt, Nielsen og Jacobsen: Fra den danske oceanografiske Expedition til Middelhavet i Vinteren 1908—1909. (Geografisk Tidsskrift, 20. H. VI, København 1910).

MARTIN KNUDSEN: Danish Hydrographical Investigations at the Faroe Islands in the Spring of 1910. (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Hydrografi, II, No. 1, København 1911).

J. N. NIELSEN: Hydrography of the Waters by the Faroe Islands and Iceland during the cruises of the Danish research-steamer "Thor" in the summer 1903 (ibid. I, No. 4, 1904).

— Contributions to the Hydrography of the Waters north of Iceland (ibid. I, No. 7, 1905).

— Contribution to the Hydrography of the north-eastern part of the Atlantic Ocean (ibid. I, No. 9, 1907).

— Contribution to the understanding of the currents in the northern part of the Atlantic Ocean (ibid. I, No. 11, 1908).

— in Schmidt, Nielsen og Jacobsen: Fra den danske oceanografiske Expedition til Middelhavet i Vinteren 1908—1909 (Geografisk Tidsskrift, 20, H. VI., København 1910).

— Sur les températures des grandes profondeurs particulièrement dans la Méditerranée, Note préliminaire, (Bulletin de l'Institut Océanographique, No. 209, Monaco 1911.)

— Hydrografiske Undersøgelser i Middelhavet; De danske oceanografiske Expeditioner i 1908—1910, København 1913.

Numerous observations, sections etc. from the "Thor" Expeditions in the Atlantic have been published in: Bulletin Hydrographique du Conseil Permanent International pour l'Exploration de la Mer, København 1902 and following years.

2. Biology.

C. H. OSTENFELD: *Thorosphaera*, eine neue Gattung der Coccolithophoriden (Berichte der deutschen Botanischen Gesellschaft, Bd. 28, Berlin 1910).

OVE PAULSEN: Plankton-Investigations in the Waters round Iceland in 1903 (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Plankton, I, No. 1, København 1904).

— On some Peridineae and Plankton Diatoms (ibid. I, No. 3, 1905).

— Studies on the biology of *Calanus finmarchicus* in the waters round Iceland (ibid. I, No. 4, 1906).

— Plankton Investigations in the Waters round Iceland and in the North Atlantic in 1904 (ibid. I, No. 8, 1909).

— The plankton on a submarine bank (in Biologiske Arbejder tilegnede Eug. Warming d. 3. Nov. 1911, København 1911).

C. G. JOH. PETERSEN: On the Larval and Postlarval Stages of the Long Rough Dab and the Genus *Pleuronectes* (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, I, No 1, København 1904).

— Larval Eels (*Leptocephalus brevirostris*) of the Atlantic Coasts of Europe (ibid. I, No. 5, 1905).

— On the young stages of the Genus *Zeugopterus* (Report of the Danish Biological Station, XII, København 1905).

— On the Larval and Post-Larval Stages of some *Pleuronectidae (Pleuronectes, Zeugopterus)* (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, II, No. 1, København 1906).

— On the Larval and Postlarval Stages of some *Pleuronectidae (Zeugopterus, Arnoglossus, Solea)* (ibid. III, No. 1, 1909).

JOHS. SCHMIDT: Fiskeriundersøgelser ved Island og Færøerne i Sommeren 1903 (Skrifter udgivne af Kommissionen for Havundersøgelser, No. 1, København 1904).

— On Pelagic Post-Larval Halibut (*Hippoglossus vulgaris* Flem. and *H. hippoglossoides* [Walb.]) (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, I, No. 3, København 1904).

— The Pelagic Post-Larval Stages of the Atlantic Species of *Gadus*, Part I (ibid. I, No. 4, 1905).

— On the Larval and Post-Larval Stages of the Torsk (*Brosmius brosme* [Ascan.]) (ibid. I, No. 8, 1905).

— The Pelagic Post-Larval Stages of the Atlantic Species of *Gadus*, Part II, (ibid. II, No. 2, 1906).

— On the Pelagic Post-Larval Stages of the Lings (*Molva molva* [Linné] and *Molva byrkelange* [Walb.]) (ibid. II, No. 3, 1906.)

— On the Larval and Post-Larval Development of the Argentines (*Argentina silus* [Ascan.] and *Argentina sphyræna* Linné, with notes on *Mallotus villosus* [O. F. Müll.]) (ibid. II, No. 4, 1906).

— Contribution to the Life-History of the Eel (*Anguilla vulgaris* Turt.) (Rapports et Procès-Verbaux du Conseil International pour l'Exploration de la Mer, Vol. V, No. 4, København 1906).

— Marking Experiments on Plaice and Cod in Icelandic Waters (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, II, No. 6, København 1907).

— On the Post-Larval Development of the Hake (*Merluccius vulgaris* Flem.) (ibid. II, No. 7, 1907).

— On the Post-Larval Development of some North Atlantic Gadoids (*Raniceps raninus* [Linné] and *Molva elongata* [Risso]) (ibid. II, No. 8, 1907).

— On the Post-Larval Stages of the John Dory (*Zeus faber* L.) and some other Acanthopterygian Fishes (ibid. II, No. 9. 1908).

JOHS. SCHMIDT: Remarks on the Metamorphosis and Distribution of the Larvae of the Eel (*Anguilla vulgaris* Turt.) (ibid. III, No. 3, 1909).

— On the Occurrence of Leptocephali (Larval Muraenoids) in the Atlantic W. of Europe (ibid. III, No. 6, 1909).

— On the Distribution of the Fresh-Water Eels (*Anguilla*) throughout the World, I. Atlantic Ocean and Adjacent Regions (ibid. III, No. 7, 1909).

— The Distribution of the Pelagic Fry and the Spawning Regions of the Gadoids in the North Atlantic from Iceland to Spain (Rapports et Procès-Verbaux du Conseil International pour l'Exploration de la Mer, Vol. X, No. 4, København 1909).

— Exposé sommaire des travaux de l'expédition océanographique danoise dans la Méditerranée (1908—1909) (La Géographie, XXI, 2, Paris 1910).

— Leptocephalus hyoprorοïdes and Lept. thorianus (Zoologischer Anzeiger, XXXVI, No. 2—3, Leipzig 1910).

— Résultats préliminaires de l'expédition océanographique danoise dans l'Atlantique et la Méditerranée pendant l'été 1910 (La Géographie, Paris 1911).

— Biology of the Eel-fishes, especially of the Conger (Nature, vol. 86, London 1911.)

— Fünf Jahre dänischer Untersuchungen über die Biologie der aalartigen Fische (Fischerbote, No. 12, Hamburg 1911).

— Contributions to the Biology of some North Atlantic Species of Eels (Videnskabelige Meddelelser fra den Naturhistoriske Forening, Vol. 64, København 1912).

— On the Larval Form of *Chlopsis bicolor* Raf. (ibid. vol. 64, 1912.)

— Danske Undersøgelser i Atlanterhavet og Middelhavet over Ferskvandsaalens Biologi (Skrifter udgivne af Kommissionen for Havundersøgelser, No. 8, København 1912).

— Danish Researches in the Atlantic and Mediterranean on the Life-History of the Freshwater-Eel (*Anguilla vulgaris*, Turt., (Internationale Revue der gesamten Hydrobiologie und Hydrographie, V, Leipzig 1912).

JOHS. SCHMIDT: Über die Fortpflanzung des Aals und seine Laichplätze (Fischerbote, IV, No. 7, Hamburg 1912.)

— The Reproduction and Spawning-Places of the Fresh-Water Eel (*Anguilla vulgaris*) (Nature, London, August 22, 1912).

— Sur la reproduction et les lieux de ponte de l'Anguille vulgaire (Bulletin de la Société Centrale d'Aquiculture et de Pêche, Tome XXIV, No. 9—10, Paris 1912).

— Ålens fortplantning och lekplatser (Svensk Fiskeri Tidskrift, Häft I, 1913).

— On the Identification of Muraenoid Larvae in their Early ("Preleptocephaline") Stages (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, IV, No. 2, København 1913).

— First Report on Eel Investigations (Rapports et Procès-Verbaux du Conseil International pour l'Exploration de la Mer, Vol. XVIII, København 1913).

— On the Classification of the Fresh-Water Eels (*Anguilla*) (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, IV, No. 7, København 1914).

A. STRUBBERG: Marking Experiments on Cod at the Færoes (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, København 1915).

BJARNI SÆMUNDSSON: Oversigt over Islands Fiske med Oplysning om deres Forekomst, vigtigste biologiske Forhold og økonomiske Betydning (Skrifter udgivne af Kommissionen for Havundersøgelser, No. 5, København 1909).

— Continued Marking Experiments on Plaice and Cod in Icelandic Waters (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri IV, No. 6, København 1913).

Ó. WINGE: On the Value of the Rings in the Scales of the Cod as a Means of Age Determination, illustrated by Marking Experiments (Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, IV, No. 8, København 1915).

Plankton.Tables resulting from the "Thor" Expeditions in the Atlantic have been published in: Bulletin des resultats acquis pendant les courses périodiques. Année 1902—03 (supplément), 1903—04, 1904—05, København 1903—1905.

Report on the Danish Oceanographical Expeditions 1908-10 to the Mediterranean and Adjacent Seas.

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